JUNE 17, 1957

# The OIL AND GAS JOURNAL

## Disappointing Demand Hurts

*That's why refiners are cutting runs* **p. 95**

## Oil-Country Steel Is Plentiful

*But the price will go up just the same* **p. 98**

## Can You Prorate Floods?

*Compact meeting hears hot argument* **p. 102**

*Special*

## Geophysical–Offshore Report

*. . . starts on page 138*

# UNIT RIG ROTARY TABLES... are mud proof

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UNIT RIG

JOURNAL News Letter

June 17, 1957
Tulsa, Okla.

The domestic oil industry is facing a minor post-Suez crisis:

Refiners are feeling a pinch now. Producers will feel it next. The trouble has been brewing for some time. It came to a head when refiners entered the motoring season with heavy gasoline stocks. The price outlook, naturally, was sloppy and showed signs of growing worse. Many refiners cut back runs and called on the whole industry to reduce production by as much as 2-1/2 to 6 per cent for 30 or 45 days (P. 95).

These refiners have all but written off the first half of the motoring season as poor. They think there's a chance, however, by eliminating over-production to strengthen the market at least by midseason.

Refinery men claim the pinch stemmed from these factors: Demand didn't live up to expectations... Middle-distillate stocks left over from the heating season were too high... Unseasonable weather hurt motoring, farm work, and some industrial activity in April and May... New car sales are running below estimates ... Highway program did not get started... The general economy is also showing some soft spots which hurt.

A minor rash of strikes actually may help refiners. The walkouts have idled plants of four companies with 259,000 bbl. daily of capacity. Involved are five refineries of Ohio Standard, Socony Mobil's East St. Louis plant, Pure's Lemont, Ill., works, and the Crown Central plant at Houston.

But the cutbacks and strikes only complicate the problem of producing oil states. They've been cutting back allowable production gradually ever since the oil lift to Europe ended and imports picked up again. With these new restrictions on their crude market, they'll be forced to shut in production more. Texas Railroad Commission will tackle the situation this week. It's expected to cut down to 14 producing days for July--and maybe 12.

WALL STREET: The unutual strength of Union Oil stocks early this month is being tied to Supreme Court ruling in the DuPont-General Motors case. Explanation of some financial men goes like this: Union last year sold Gulf Oil $130 million of 3-1/2 per cent debentures convertible into 2,400,000 shares of Union common. If converted, the shares would give Gulf 24 per cent of Union shares outstanding and operating control. Some larger Union stockholders at the time were displeased with the deal and liquidated. But the Court has now held

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that DuPont's ownership of 23 per cent of the stock in General Motors violates the antitrust laws. Financial writers think this ruling also will jeopardize Gulf's conversion deal with Union. They report the disgruntled former Union owners are buying back into the company.

Many investors apparently are betting the much-talked merger by J. Paul Getty of Getty Oil, Mission Corp., Mission Development, Tidewater, and Skelly is near. Since the death of W. G. Skelly, who blocked a similar deal 10 years ago, all the stocks have climbed. Skelly has gone up $8 per share, Tidewater $7, Mission Development $12, Mission Corp. $14, and Getty $14. The appreciation in Getty stock alone has given the Getty family $160 million paper profits in less than 2 months.

Other oil stocks generally are doing well too. Investment trusts reportedly again are making oil their favorites. This development may be due largely to the good first-quarter earning reports, especially for the international companies. They had figured not to do so well because of the Suez crisis.

STEEL: The oil-country market for steel is becoming softer. Supply is catching up with demand on most items. Large suppliers who term the oil-country steel market spotty pin-point these developments: Deliveries are now nearly current. Cancellations are more prevalent. Extra tonnage has been diverted to oil-industry needs (P. 98).

Factors contributing to the situation: Reduced buying by oil companies, which have begun to live more off their inventories. Buyers have tailored orders to short-term needs. Drilling activity is down. Bad weather has slowed many oil-field operations. So suppliers now are warning buyers not to delay orders too long or everyone will jump into the market at once with a resulting scramble for steel.

At least one thing appears certain: Steel prices will go up in July. Talk ranges from a price hike of from $6 to $8.50 a ton in basic price, which means considerable more by the time the increase reaches oil-country goods.

WASHINGTON: The Harris-O'Hara gas bill still faces a rocky road in spite of the President's action last week. He revived the bill by saying two proposed administration amendments were not vital. House now is expected to get down to work quickly on the measure. Whether it can ever pass the Senate in the 2 months left before adjournment is still a big question.

EXPLORATION: Amerada has another significant strike that makes its 120,000 acre block in northeastern Montana look good. Latest discovery is its 1 Ruegsegger, rated at 293 bbl. daily from Silurian perforations at 9,067-71 ft. The well is 2 miles northwest of Amerada's 1 Tange, which opened Outlook field late last year flowing 2,742 bbl. daily from the Silurian. Only 2 weeks ago Amerada completed its 1 Loucks, 4 miles southwest of the Tange. It flowed 312 bbl. daily from the Ordovician-Red River.

Southwest Enville field in Love County may change the oil-finding picture in deep southern Oklahoma. Production there has been found in the Basal Oil Creek sand on a large structure which may have 2,000 ft. of relief. The field has stepped up geological interest in Love, Marshall, and Bryan counties.

One of California's largest gassers in recent years has been completed by

General Petroleum on the north edge of Beehive Bend gas field in Glenn County. The 6,619-ft. 2 Sprague Lewis reportedly tested at rate of 36,880 M.c.f. daily from two zones.

Bright prospects apparently have faded for Venezuelan Atlantic Refining Co.'s well northwest of Santa Barbara field. On further tests well flowed fresh water with only traces of oil. Electric-log interpretations earlier indicated unusually thick prospective oil sections.

Israeli exploration has a shot in the arm. A new well 5 miles southwest of the original Heletz discovery has 15 ft. of net pay at 4,990 ft. The well was drilled near Broor Haifel, 2 miles southeast of Heletz 10. Operators still are uncertain whether the prospect has brought a new field or extended Heletz.

The French think they have found a larger structure than at first believed in the mid-Sahara desert region of Algeria. Paris reports indicate the third well in the vicinity of the Hassi Messaoud discovery has encountered a deep productive zone.

Pakistan Sun Oil has acquired a concession right on 10,000 sq. miles in the southern and southwestern section of West Pakistan.

Outlook is termed excellent for a Mission Canyon oil discovery by Canadian Oil Companies, Ltd., and Devon Palmer at their joint wildcat in southeast Saskatchewan. Good shows were obtained on tests at 4,084-94 ft. Test is 100 miles southeast of Regina and 8 miles north of Steelman field. It is first of 18 wells programmed by the firms.

DRILLING: A new water-depth record in offshore operations will be set soon by Gulf Refining and Humble. A stationary platform is being erected on their South Timbalier Block 135 lease off Louisiana for drilling in 120 ft. of water. First well will be spudded soon from the $500,000 platform. Previous depth record in the gulf was 112 ft. set by C.A.T.C. Group.

California will exact higher royalty payments from future production in its tidelands. A bill putting a 16 2/3 per cent floor on royalties has passed the legislature and is before the governor. The bill calls for awarding leases on a cash-bonus basis plus a fixed or sliding-scale royalty or awarding them on basis of highest royalty bid.

Shell has ordered its first drilling barge for use in Nigeria. The $3.6-million unit will operate in mangrove tidal swamps in the Niger Delta, which extends for 30 to 40 miles from the coast. Shell expects to spud the first well about 20 miles south of Port Harcourt in the estuary of New Calabar River.

PRODUCTION: Interstate Oil Compact Commission has hold of a hot potato: Can water floods be prorated without loss of ultimate recovery? The question is now a serious one facing regulatory bodies of several states. It was the hottest topic at Compact's Yellowstone Park meeting. Pressure is being put on a committee of the Compact to make an engineering finding on the issue by the end of this year as a guide to policy action (P. 102).

Unitization is fast becoming a potent means of hiking U.S. oil recovery. The Interstate Oil Compact Commission has a detailed report showing: 404 unitized conservation projects were operating at the first of the year. They accounted for 302,477,605 bbl. or 11.5 per cent of total U. S. production in 1956.

The economics of recovering oil from California tar sands will be

evaluated by Union Oil Co. in the next year. Union is acquiring leases on huge deposits near Santa Maria and plans to have a 100-bbl. pilot plant in operation by December.

An interesting case history on a successful water flood will be found on page 122. Its profit report: Value of extra oil produced, $2,440,000; investment-operating costs for 76 months, $743,000; net revenue to all interests, $1,697,000. The project flooded the fractured Marble Falls limestone in Kirk field of Eastland and Comanche counties, Texas.

List the "frac assist" among the new tools being tested to help in fracturing deep wells. It is a pressure chamber fitted into the tubing string and acts as a temporary booster in creating a larger initial fracture. This tool is activated by a plunger after an injection rate has been established. By the controlled burning of a rocket-type fuel, it can deliver 41 bbl. per minute at 5,000 psi. bottom-hole pressures for a short time.

The way has been cleared for a big water flood in the Long Beach Harbor area of Wilmington field. Project will have double purpose of checking land subsidence and increasing oil recovery. A bill enabling Long Beach to pool city properties with those of offsetting oil companies was approved by California legislature. Governor Knight has indicated he will sign it.

PIPELINING: El Paso Natural is plunging into what likely is the biggest gas-development campaign ever carried out by a single company in the Panhandle. The pipeline giant has acquired 53,000 acres of shallow Brown Dolomite gas acreage from Phillips Petroleum for $6.7 million. The deal brings its holdings in Panhandle to 178,000 acres, representing a cash outlay of more than $40 million in less than a year and a half.

The acreage is reasonably proved but sparsely developed. El Paso expects to sink 500 wells, possibly more, in drilling up the acreage. This will jump the bill by another $10 million. In addition El Paso must dig deeper for funds to lay gathering and trunk lines to handle the gas.

One reason why natural-gas market development has lagged in Midwest is lack of underground storage. Value of depleted fields where gas can be injected in low-demand summer months for withdrawal in winter, is pointed up by Northern Illinois Gas President Marvin Chandler. He said the Herscher storage near Chicago, which cost $24 million, makes available about as much gas as a new $150 to $200 million pipeline.

Look for Texas Eastern Transmission Corp. to join the select group of gas-transmission companies capable of handling more than 2 billion cubic feet of gas within the next 2 or 3 years. At end of this year, the company will be able to handle 1.8 billion cubic feet. It already is drawing up projects which will put it over the 2-billion mark. Only other lines now handling that much gas are Tennessee Gas Transmission, El Paso Natural, and United Gas.

Work will start immediately on Four Corners Pipe Line. Bids already have been let on 485 miles of the 750-mile system from the New Mexico-Arizona-Colorado-Utah region to Los Angeles. Rest of the contracts will be let soon.

Look for production of line pipe to hit a new record of 4 million tons this year. This is well above last year's 3 million ton production and quadruple 1946's output.

# Let's get technical about WALWORTH LUBRICATED PLUG VALVES for pipeline service

Combination button-head lubricant fitting and lubricant screw is provided at no extra cost. Valves can be lubricated with a Walworth High Pressure Lubricant Gun without removing the screw . . . little chance of grit getting into the valve. (Always use Walworth Lubricants with Walworth Lubricated Plug Valves.)

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In the stainless steel check valve unit, a transverse pin holds two balls in their seats. When the valve is properly adjusted and lubricated, there is no chance for line pressure to get into the lubricant system.

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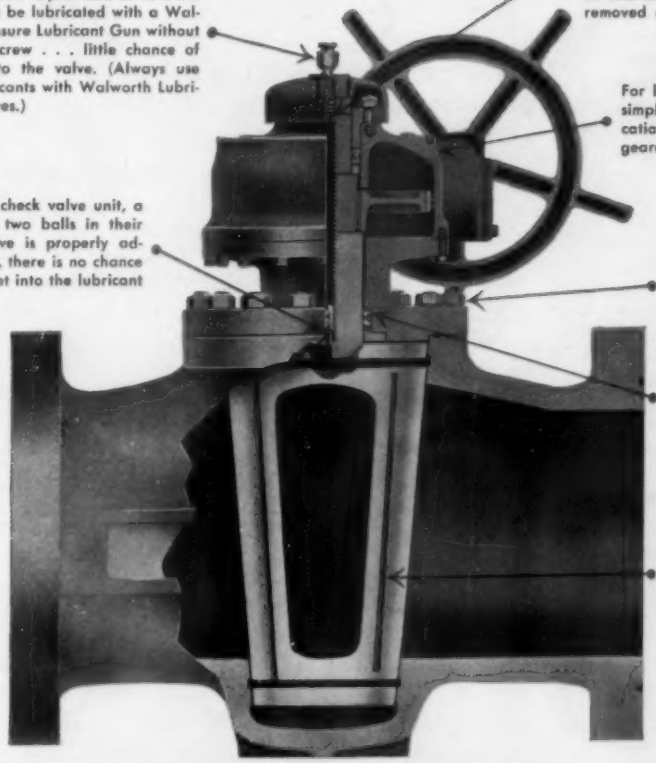

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Cutaway of a 24-inch Walworth Lubricated Plug Valve

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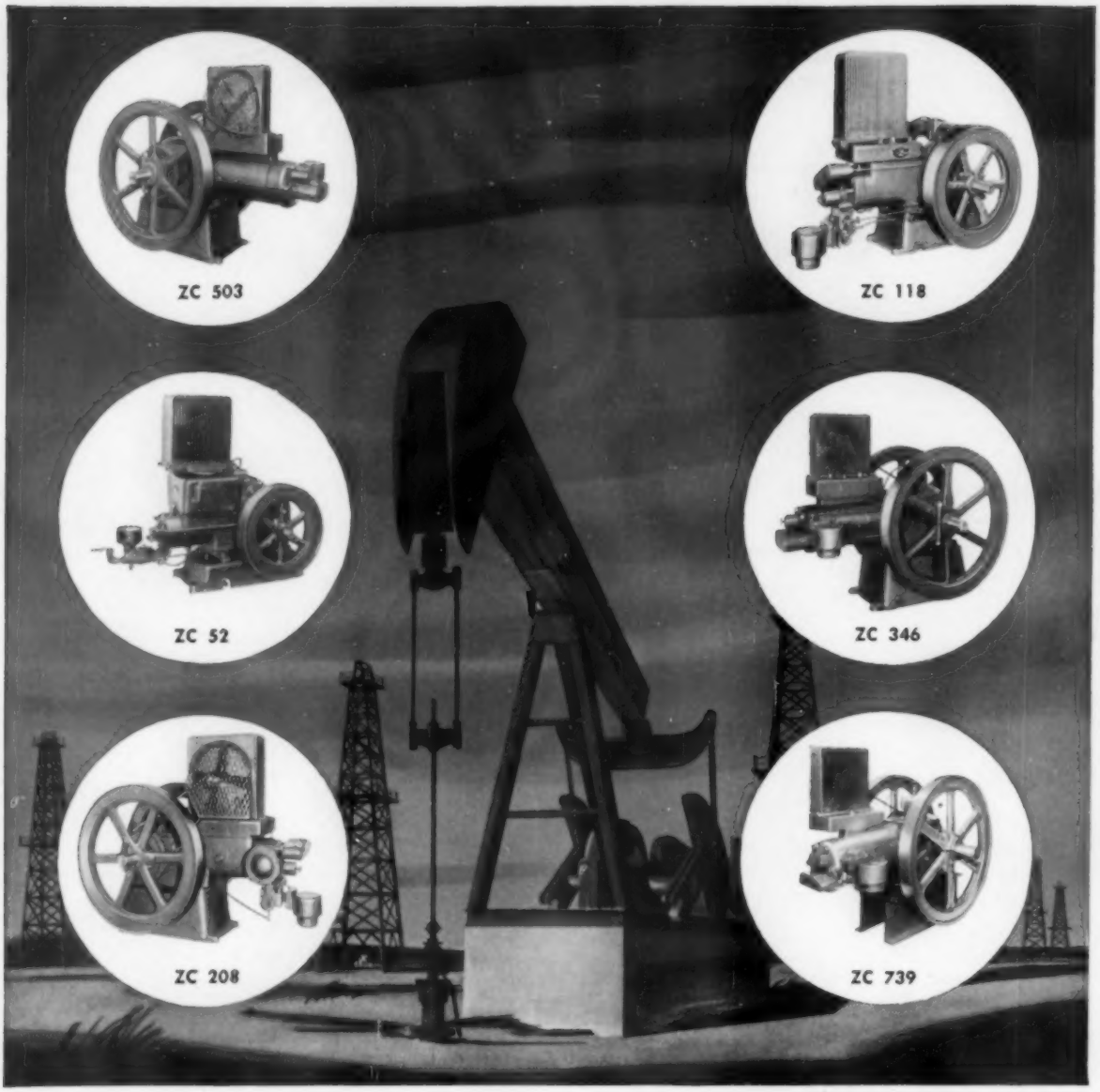


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# Here's what the men in the field say about "Oilwell" Expendable Fluid End Parts

"...they gave us the best in pump performance."

"...I know I will get top quality material and maximum pump performance."

"...we always use them to maintain top performance."

"...the only answer for maximum performance."

Names furnished on request.

### Exclusive Advantages of "Oilwell" Fluid End Parts give you extra service for your money

**LINERS** are armored with "Oilwell's" exclusive DI-HARD* metal, and average up to 43% longer service.

**VALVES AND SEATS** have greater fluid flow area through the seat, improve pump operating efficiencies.

**PISTON RODS** have electronically controlled, induction-hardened, ground-and-polished HI-HARD* surface with high tensile core. Round root threads resist fatigue.

These and other men who have worked with "Oilwell" and Wilson-Snyder Slush Pumps agree that "Oilwell" piston rods, liners, valves and seats outperform others. You can prove this to yourself. Install "Oilwell" valves and seats, DI-HARD* liners and HI-HARD* piston rods on one side of your pump, and whatever brand you are now using on the other . . . then compare results.

Be sure to order genuine "Oilwell" parts at your nearest "Oilwell" store.

*Trademark Registered U. S. Patent Office*

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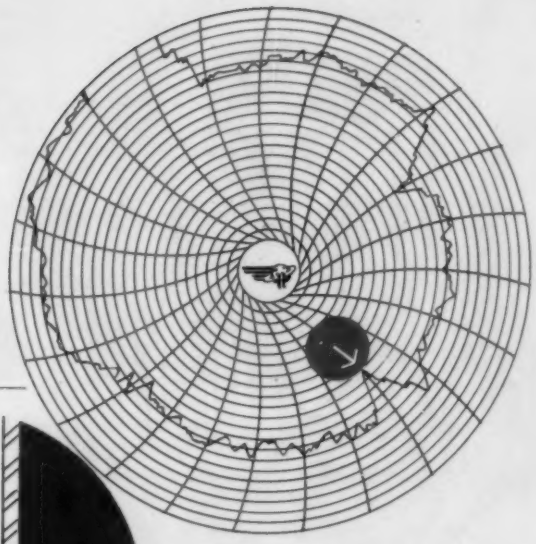
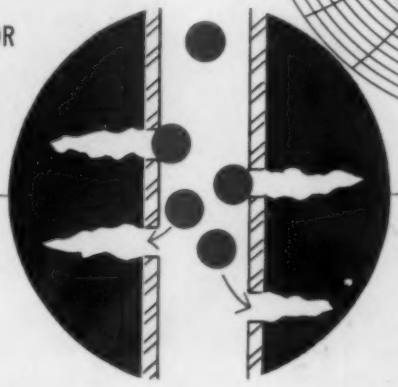
# now... hydrodynamic programming!



ANOTHER HALLIBURTON SERVICE FOR

**MULTIPLE FRACTURING**

OF ONE OR MORE ZONES



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### PERFPAC IS VERSATILE... CAN BE USED

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- Through tubing, annulus or casing.
- For all types of perforations, jet or bullet.
- With all types of fracturing or treating fluids.

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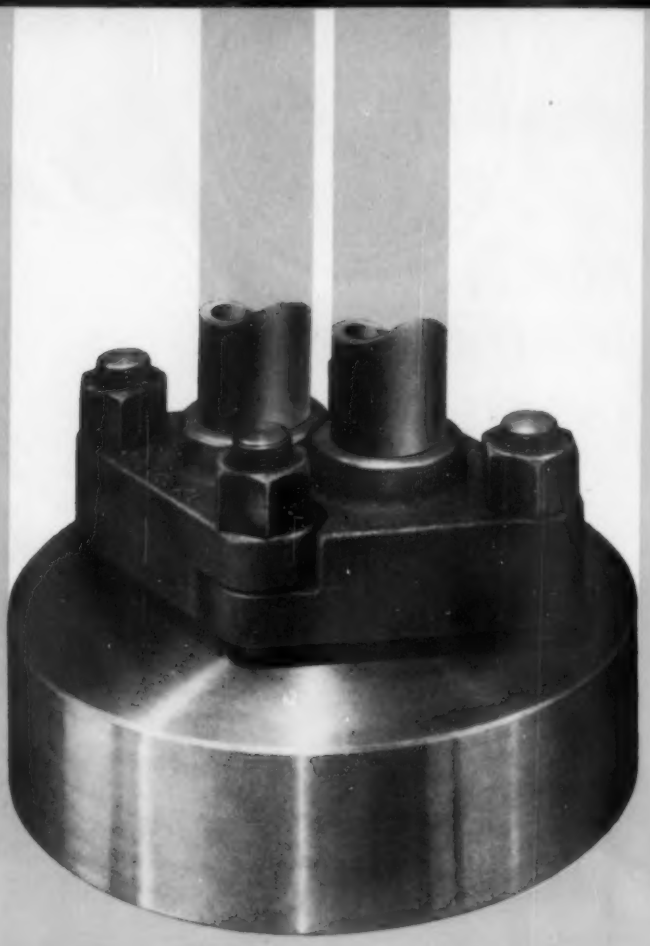
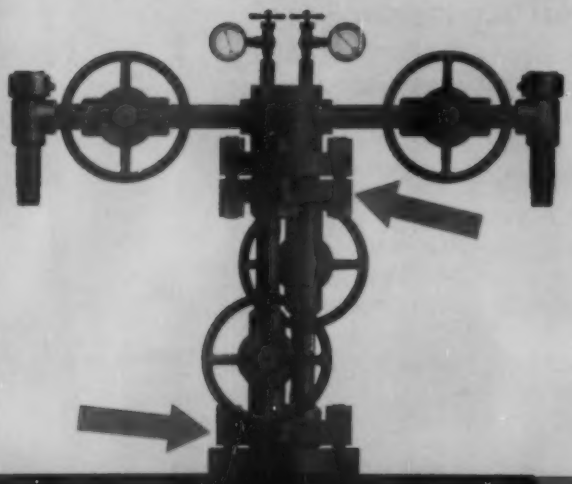
251 SERVICE CENTERS — JUST MINUTES AWAY FROM ANY RIG

# it's new!

## THE O·C·T DELTA FLANGE



## BEST THING THAT EVER HAPPENED TO A DUAL STRING TREE



Developed and proved by O-C-T, Delta Flanges are the latest improvement in dual string tree construction.

O-C-T Delta Flanges are unusually strong because each flange half is supported—in perfect balance—by three equally spaced studs and nuts. This balance, plus compact design, accounts for unusual strength and freedom from leakage. Laurent Seal Rings are utilized to keep the pressure area at a minimum.

Ask your O-C-T Representative about the many advantages of Delta Flanges or write for complete information and literature.

O·C·T

**OIL CENTER TOOL CO.**

Export Representatives: South America—East West Oiltools, C. A., Del Lago Hotel, Maracaibo, Venezuela. Address Export Inquiries for All Other Countries to P. O. Box 3091, Houston, Texas.

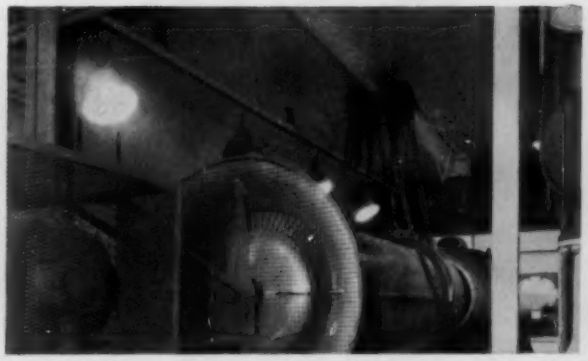
**DELTA FLANGES ARE JUST ONE MORE REASON WHY O-C-T DUAL STRING TREES HAVE SET THE INDUSTRY STANDARD**

# *How to set your mind at rest about*

# FIRE!

YOU can't be expected to know *all* the answers about every type of fire hazard. But Grinnell, with 87 years' experience protecting against fire hazards of every description, has thorough background knowledge upon which you can draw. Let a Grinnell Fire Protection Engineer recommend the best system for you . . . whether it be water spray, air foam, carbon dioxide, or dry chemical.

**WATER SPRAY PROTECTION** Asphalt coating machine at Alabama Pipe Company, Anniston, Ala., has a Grinnell ProtectoSpray System.



**AIR FOAM PROTECTION** Engine test cell at Trans World Airlines, Inc., Kansas City, Mo., is protected by a Grinnell ProtectoFoam System.

**DRY CHEMICAL PROTECTION** Hot oil dip tanks at Royal Canadian Air Force Supply Depot, Namao, Alta., has a Grinnell dry chemical installation.

**CARBON DIOXIDE PROTECTION** Record storage vault at West Penn Power Company, Greensburg, Pa., uses a Grinnell carbon dioxide installation.

Remember, extra hazardous areas, where special protection must be provided to insure against possible serious loss by fire, are fairly commonplace in industry today. Illustrated here are a few of these, along with the fire protection systems recommended to arrest fire. But there are many others, where major or minor supplements to ordinary-hazard fire protection systems are necessary, if trouble is to be averted.

With a full range of equipment, you can rely on Grinnell to give you unbiased recommendations on the system best suited to your requirements. Remember, too, the installation of the proper Grinnell System usually serves to reduce fire insurance premiums drastically, often pays for itself in a few years. So don't delay. For further facts, write Grinnell Company, Inc., 256 West Exchange Street, Providence, R. I. Branch offices in principal cities.

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*Manufacturing, Engineering, and Installation of Fire Protection Systems since 1870*

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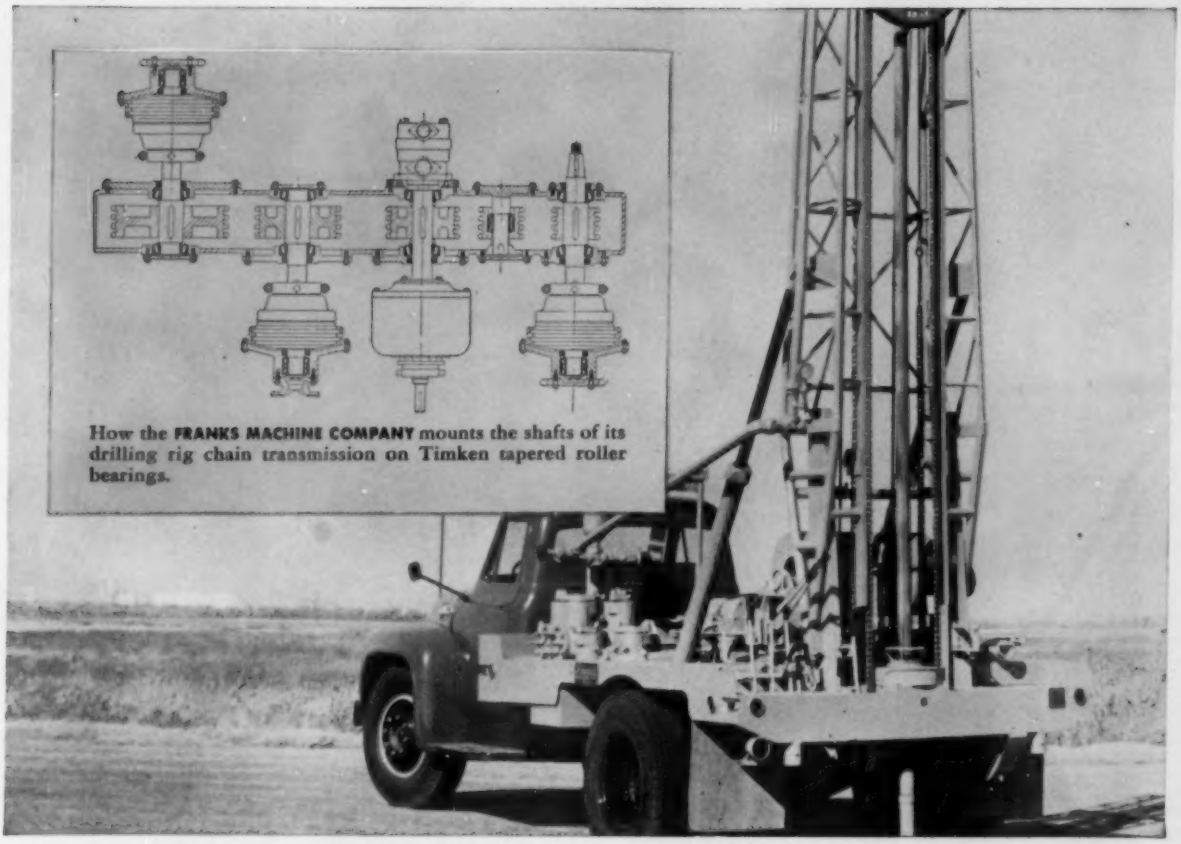


How the **FRANKS MACHINE COMPANY** mounts the shafts of its drilling rig chain transmission on Timken tapered roller bearings.

# Drilling power chain—transmitted over 5 sprockets...shaft rigidity maintained with TIMKEN® bearings

THIS portable drilling rig, built by Franks Machine Company, was designed for tough shot-hole, core drilling and water well work. Power is transmitted to various units of the machine through one ¼" roller chain running over 5 sprockets. All transmission shafts are mounted on Timken® tapered roller bearings. Timken bearings maintain high efficiency in the transmission of power, give longer bearing life and reduce wear on related parts.

Tapered construction of Timken bearings lets them take radial and thrust loads in any combination. Full line contact between rollers and races provides extra load-carrying capacity. Timken bearing rollers and races are *case-carburized* to take heavy shock loads encountered by rigs of this type . . . with hard, wear-resistant surfaces over tough, shock-resistant cores.

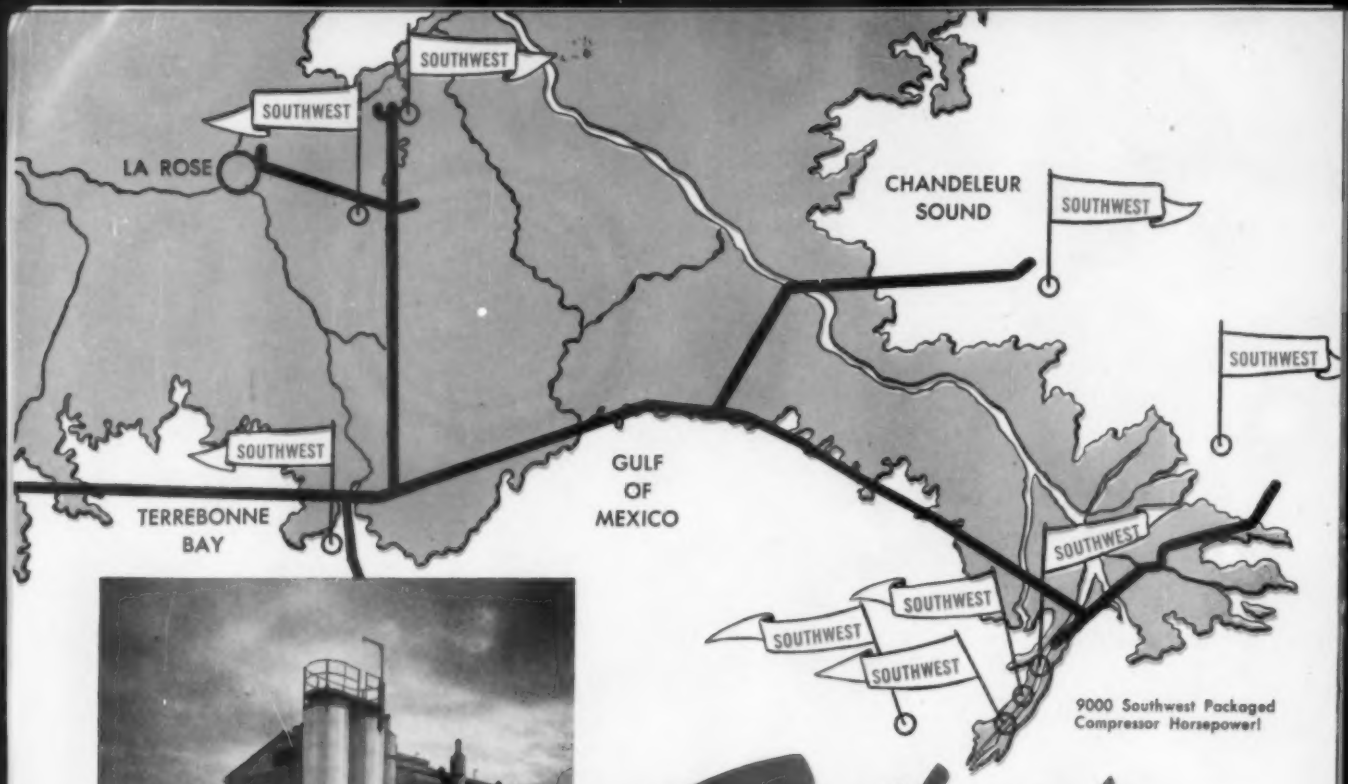
Franks Machine Company also mounts the rotary table drive quill on Timken bearings. Geometrically designed and precision-manufactured to give true rolling motion, Timken bearings practically eliminate friction. To insure highest quality, we even make our own steel—something done by no other American bearing maker. Next time you build or buy machinery, look for the trademark "Timken". The Timken Roller Bearing Company, Canton 6, Ohio. Canadian plant: St. Thomas, Ontario. Cable address: "TIMROSCO".

*This symbol on a product means its bearings are the best.*

**TIMKEN**

TRADE-MARK REG. U. S. PAT. OFF.

TAPERED ROLLER BEARINGS ROLL THE LOAD




9000 Southwest Packaged Compressor Horsepower!

# Southwest

## PACKAGED GAS COMPRESSORS FEEDING "THE MUSKRAT LINE"

From the South Pass area of the Mississippi Delta west for almost 400 miles to Crowley, La., the Muskrat Line lies in swamps, bays, and marshes. Eighty per cent of the line lies underwater! To boost the pressure of gathering lines feeding into it, five majors have turned to Southwest Packaged Gas Compressor Plants. These Southwest units can be installed in any location to do any compressing job. These balanced units can be mounted on piling, concrete platforms, barges, or wherever necessary for most economical installation and operation.

Southwest plants are saving gas producers thousands of dollars in the rugged swamp country of South Louisiana through low installation and low operating costs. Available in sizes from 265 hp to 660 hp.

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Because it

**gives you more efficiency and reliability – more for your money**

Because

**we manufacture our swab cups in our own rubber plant – from our own carefully compounded synthetic rubber formulas**

Any load you can safely handle will come up with the Guiberson "J" Cup — the tough, heavy-duty cup designed to bring up every thing but the tubing! Look for it in the Yellow Box.

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# ®Traveloader easily handles bulky heat exchanger bundles with ONE machine and ONE operator

• Traveloader, the unique Baker side-loading fork truck, is ideally suited for removing, storing and installing heat exchanger tube bundles. In the above photo, it is placing a bundle it has just removed from a process system, onto "Christmas Tree" racks in yard storage.

Traveloader is a revolutionary handling machine designed expressly for long, unwieldy, awkward loads. It picks them up from the side, carries them securely on the truck deck, and stacks them to a height of 12 feet. It operates indoors and out, over paved or unpaved roadways—and over highways at speeds up to 30 MPH. Capacities from 10,000 to 12,000 pounds—gas or diesel operated.

*For complete information, write for Bulletin 1360.*

Baker®
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# Why today's higher loads and speeds demand LINK-BELT roller chain

RESISTANCE TO TENSILE STRESS is achieved with properly heat-treated, accurately machined sidebars made of premium steel and fitted with properly hardened pins, bushings and rollers. But in drilling, static strength isn't enough.

STRENGTH OF CHAIN IN MOTION results from added refinements: pitch-hole preparation, micro-finish of parts, special processing of sidebars, pre-lubrication. It means longer life for sextuple-width drive on **IDECO M-2500** *3-speed transmission.*

At 2,000- or 20,000-feet tough hoisting and rotary service require the greater *dynamic strength* built into Link-Belt precision steel roller chain. It means smoother going the entire trip—faster penetration, more on-bottom time plus the durability to get you back without breakdown.

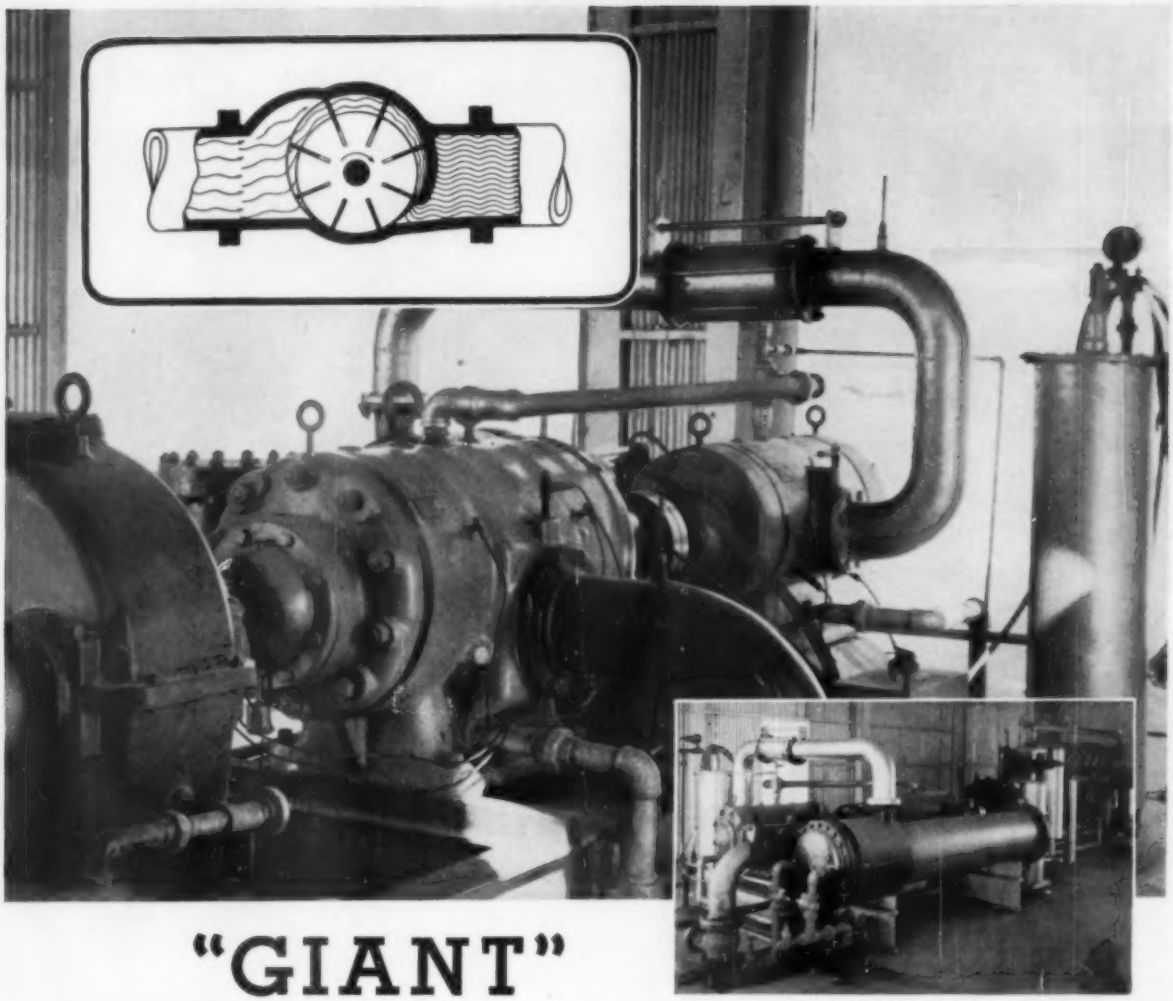
This added capacity to resist shock, centrifugal loads and similar stresses is achieved through special Link-Belt design and manufacturing refinements—special processing of sidebars, pre-stressing of multiple widths and others. In addition, coupling and uncoupling of multiple widths are simplified by Link-Belt's exclusive E-Z assembly feature. Shot-peening and the Shepherd's Crook cotters add other bonus benefits.

For complete information and specifications on Link-Belt roller chain, ask for Catalog 2780. 14.3313

**LINK-BELT**

**ROLLER CHAIN & SPROCKETS**

LINK-BELT COMPANY: Indianapolis 6, Houston 1, Dallas 21, Odessa, Tex., Shreveport, La., Los Angeles 33, Scarboro (Toronto 13); Export Office, New York 7. Distributors in All Fields.



# "GIANT"

## ANOTHER FULLER ROTARY COMPRESSOR INSTALLATION

Everything's big in Texas and compressors are no exception—not particularly in physical size but big in service!

That's why you'll find so many Fuller rotary compressors in use where trouble-free gas gathering and boosting, as well as refinery gas recirculation is demanded at low cost, peak output, with minimum attention.

Oil men know what they'll get when they specify a Fuller rotary compressor. Here are the plus features: compactness; ease of installation; elimination of valves, crank-shafts, pistons, and other moving parts, greatly reducing "down time" for inspection and maintenance. Metering problems and pressure fluctuations are reduced to a minimum because of rotary motion. Blades held out by centrifugal force, compensate for wear, maintaining original capacity for the life of the machine.

Shown here is another Fuller rotary installed in Texas. It's a C-200-200H, two-stage compressor driven by a gas engine through a gear reducer for boosting casing head gas from 5-lb. to 115-lb.

Write for Fuller Compressor literature.

**FULLER COMPANY**
**132 Bridge St., Catasauqua, Pa.**
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**PIONEERS OF HIGH-EFFICIENCY VANE TYPE ROTARY COMPRESSORS SINCE 1930**

# HOT...

## *but not bothered*

**By High Temperatures in Deep Drilling With KYLO* Brand Additive for Drilling Mud**

When you encounter high temperatures in deep holes, that's the time to use KYLO additive in your mud. It conditions the mud, reduces filtration, makes a tough, slick filter cake and reduces the incidence of stuck pipe, bridging or caving troubles.

KYLO mud additive is easily mixed through the conventional hopper. You can use it in a wide range of muds treated with any of the common mud chemicals.

KYLO, a new mud additive distributed by Baroid, is field-proved. Write today for newest technical data on this product.

*Manufactured by Minnesota Mining and Manufacturing Company. Trade Mark Registered U. S. Patent Office.

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Please send me data on KYLO Additive.

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Company_____

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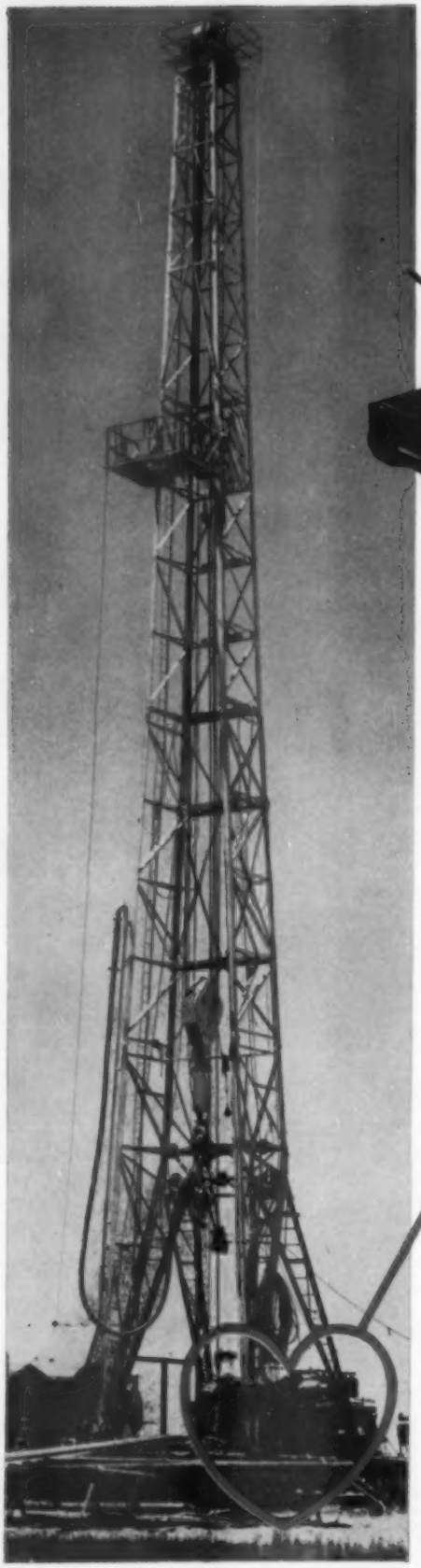
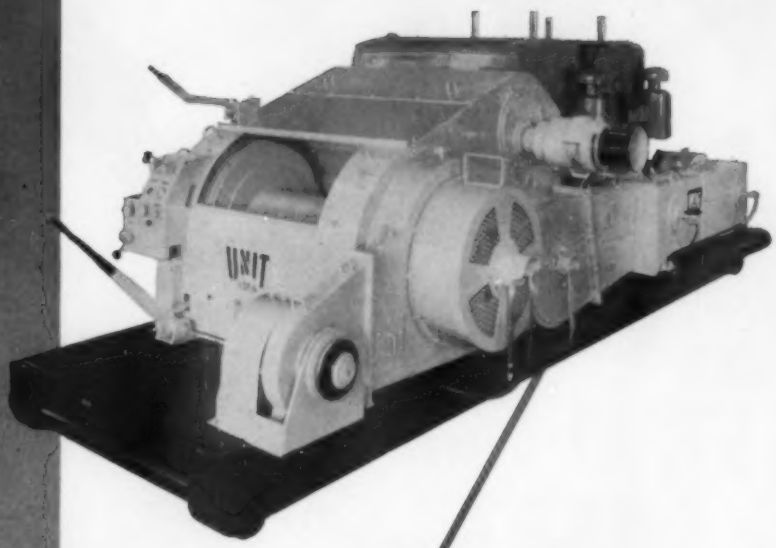
City_____ Zone____ State_____

OGJ






# *There's ECONOMY at the Heart of this Rig*

**U-36-A Unit Rig drawworks provides economy because it is engineered for fast drilling, extra depth capacity and convenient rig moves. While rated at 300 to 600 horsepower input, the No. 1 U-36-A, drilling in Wyoming, completed its first field well at 9,248 feet. In the Texas Panhandle, an oil operator using a U-36-A is consistently making hole at record rates. Contractors and oil operators who purchase Unit Rigs regularly get greater dollar value with the extra "built-in" capacities. For complete details on a Unit Rig for your requirements, contact your Mid-Continent representative.**

**Write for U-36-A Bulletin**

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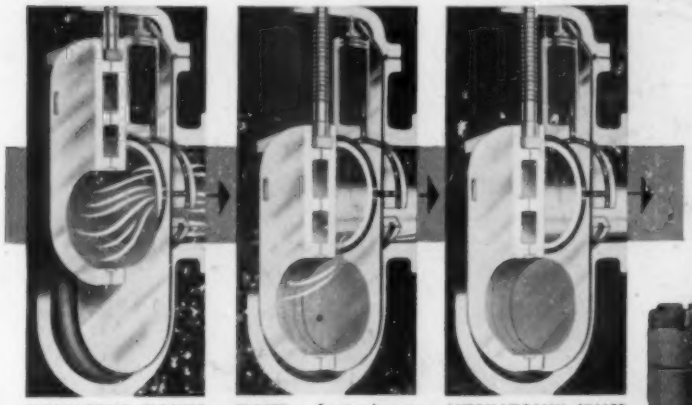
THE WORLD'S LARGEST INDEPENDENT OIL FIELD SUPPLY COMPANY

*For pipeliners who hate leaks!*

# DARLING-McEVOY SELF-SEALING CONDUIT VALVES



**APPROACHING CLOSURE** ... *No loss of sealant as sealing groove in seat is disconnected from reservoir until gate is fully closed.*

**CLOSED** ... *Jumper in gate now permits differential pressure to feed sealant into seat groove to check any remaining flow.*

**AUTOMATICALLY SEALED** ... *Pressures again in balance. Tightness established. No additional sealant used until again needed.*

THE DIAGRAMS above show how these unique conduit gate valves seal themselves *automatically* . . . by means of a long lasting reservoir-held sealing compound . . . for leak-proof, pressure-tight closure every time! This feature, with flow in either direction, self-aligning non-wedging gates, and fully protected non-distorting seats, means exceptional performance, utility and service life. For additional information on these fully field-proved Darling-McEvoy valves, ask for Bulletin 5402.

DARLING VALVES

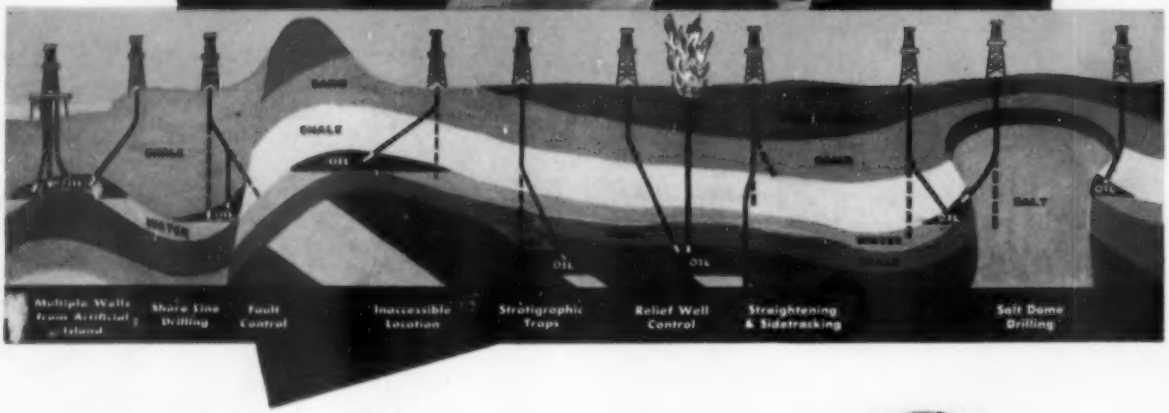
## DARLING VALVE & MANUFACTURING CO.

Williamsport 1, Pa.

*Manufactured in Canada by Sandilands Valve Manufacturing Company, Ltd., Galt 19, Ontario*

# EASTMAN

## THROWS A TRUE LIGHT ON SUB-SURFACE SURVEYS




The value of Eastman's contributions to oil's progress is inestimable. As *originator* of Controlled Directional Drilling . . . Sidetracking . . . and *pioneer* of oil well bore hole surveying, Eastman has dedicated 27 years to these highly specialized services. It is little wonder then that the methods, techniques, and specialized tools developed and perfected by Eastman have become the accepted standards throughout the world. That's why you can call on Eastman — any hour day or night — with full confidence that you will receive superior service and impeccable counsel.

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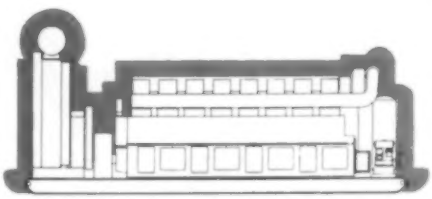
*DIRECTIONAL DRILLING . . . SIDETRACKING . . . OIL WELL SURVEYING*

# TURBOCHARGING HITS THE GAS FIELDS

You'll find the newest development for cutting costs of gas handling described on the following pages.

# NEW TURBOCHARGED
## GIVES YOU BIG ENGINE PERFORMANCE, BIG

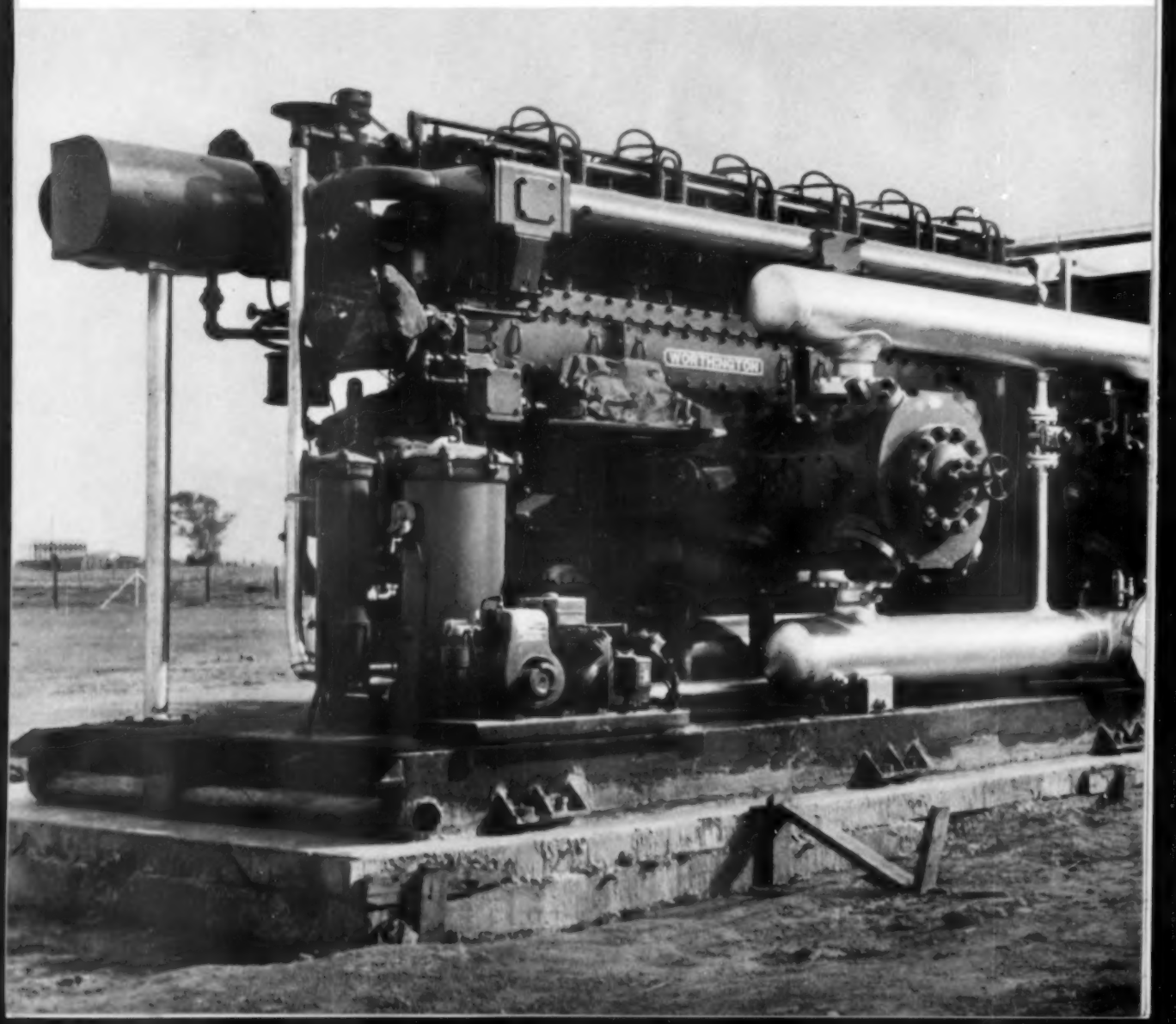


**MORE COMPACT** than non-turbocharged units, Worthington's new SLHC gas engine compressor cuts fabrication, installation, and moving expenses.

After five years of research, development and testing, Worthington now introduces the all-new SLHC—the only turbocharged gas-engine compressor in the medium horsepower range (330 to 880 hp.).

Turbocharging is the key to the SLHC's ability to slash gas handling costs. Turbocharging makes the new SLHC more compact, more economical, more reliable. Turbocharging gives you big engine performance, big engine economy in the smaller horsepower sizes.

**MORE COMPACT**—The new SLHC is considerably more compact than naturally aspirated units. Its smaller size cuts the cost of fabrication, installation and moving. Well under the maximum allowable



# ENGINE COMPRESSOR

## ENGINE ECONOMY IN SMALLER HP SIZES

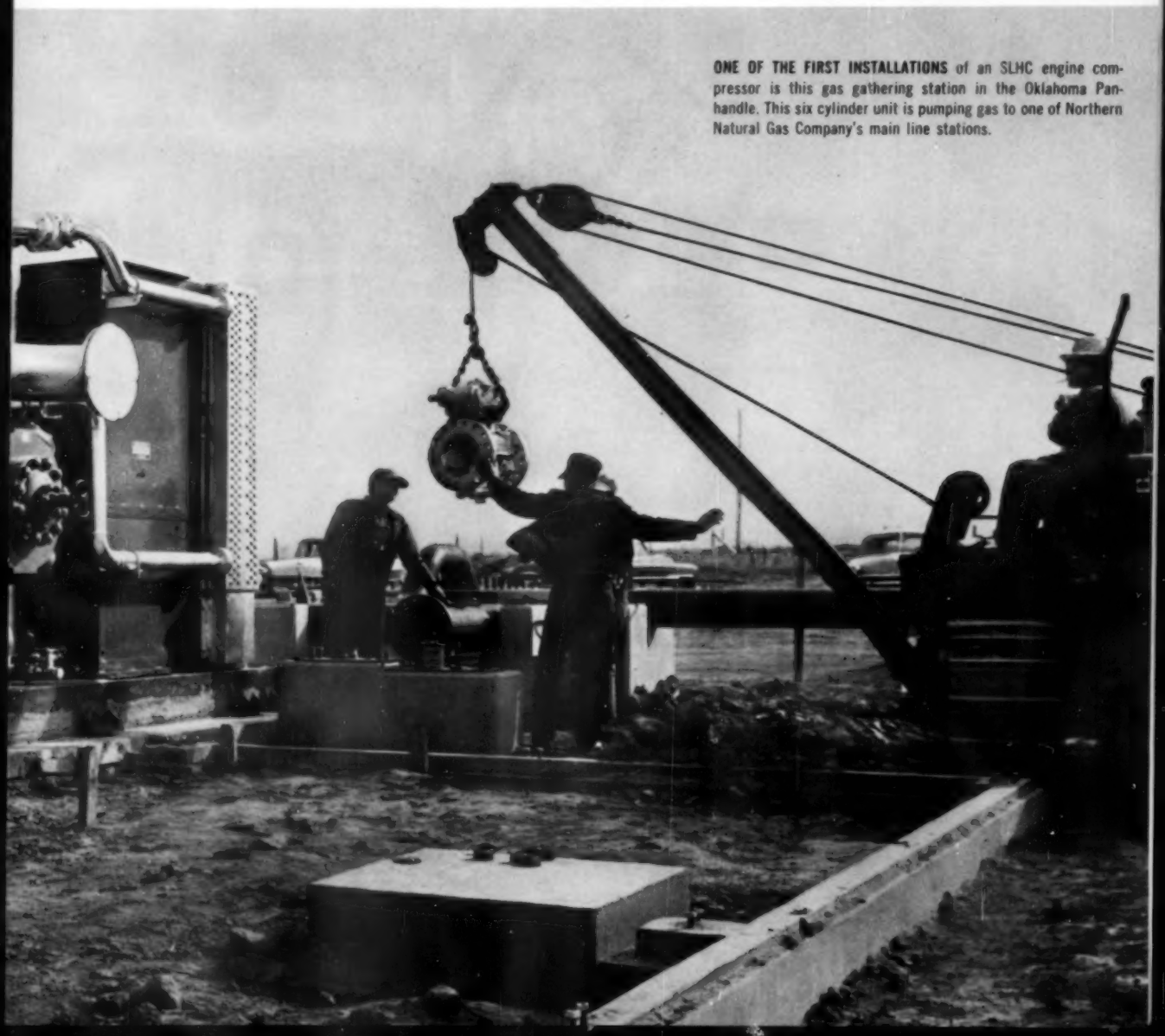
width, the SLHC can move over most highways without special—and expensive—procedures.

**MORE ECONOMICAL**—Turbocharging gives the new SLHC the lowest fuel consumption of any engine compressor in its size range. At full load, you get guaranteed fuel consumption of only 7,000 Btu/bhp/hr. Heat rejection to the jacket water and lube oil is as much as 34% less than comparable non-turbocharged units. As a result, a smaller, less expensive radiator is required.

**MORE RELIABLE**—Its moderate engine speed (450 rpm) and conservative bmep makes the SLHC one of the most reliable four-cycle engines ever produced. It uses a turbocharging system proved by Worthington experience on thousands of engines for all types of application.

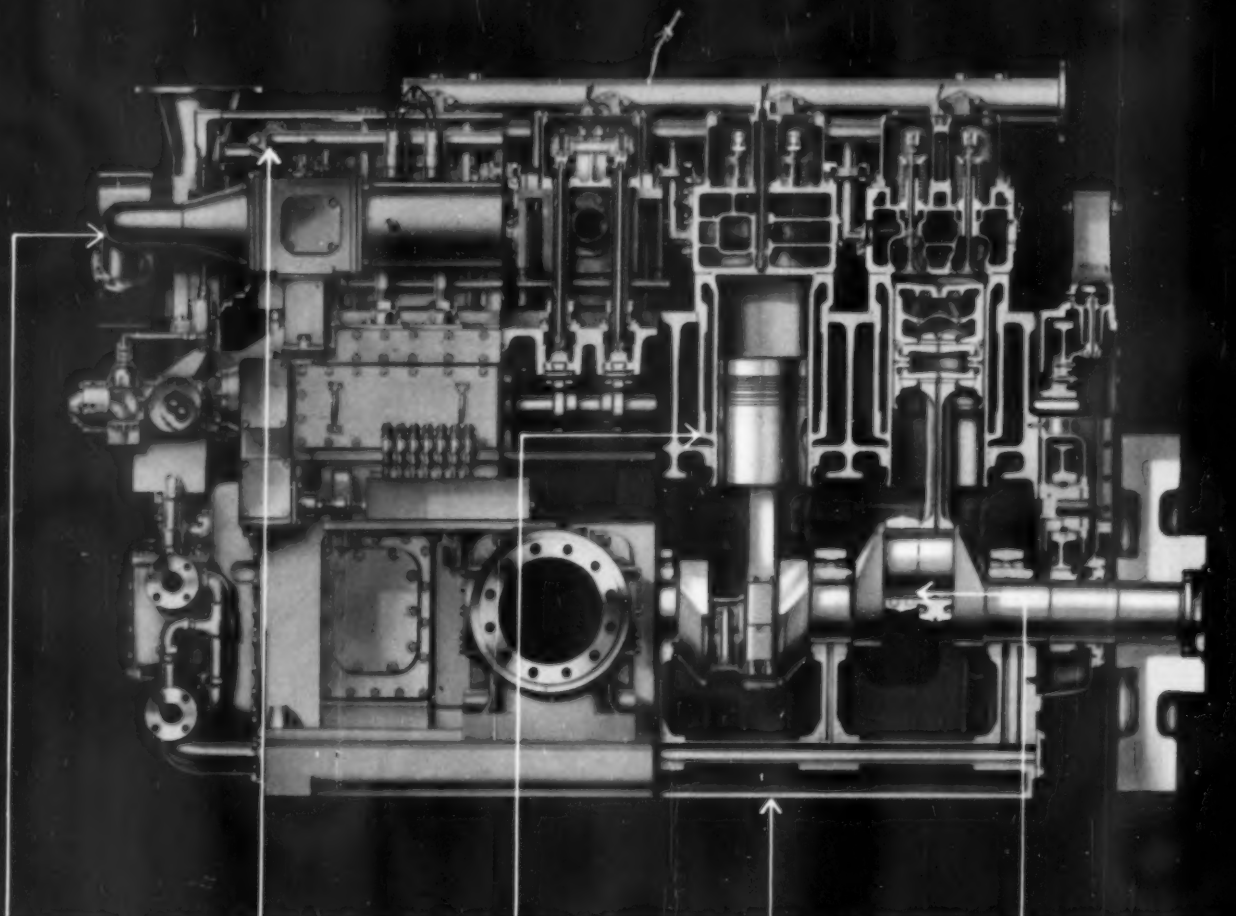
Now in quantity production at Worthington's Buffalo Division, the new SLHC gas-engine compressor is supplied in 4, 5, 6, 8, or 10 cylinder in-line units for skid-mounting or permanent installation. For more information mail coupon on next page. Worthington Corporation, Harrison, N. J.

**WORTHINGTON**



**ONE OF THE FIRST INSTALLATIONS** of an SLHC engine compressor is this gas gathering station in the Oklahoma Panhandle. This six cylinder unit is pumping gas to one of Northern Natural Gas Company's main line stations.

# THESE ADVANCED FEATURES MAKE THE NEW SLHC 5 YEARS AHEAD IN DESIGN



**EXHAUST-POWERED TURBO-CHARGING** gives maximum output per cubic inch of displacement in the minimum floor space and weight per brake horsepower.

**GOVERNOR CONTROLLED AIR AND GAS VALVES** meter correct air-gas ratio for every power condition. For maximum economy, system gives constant air-fuel ratio at all loads and speeds.

**INTEGRALLY CAST WATER JACKET IN CYLINDER LINER.** Water cannot leak into the crankcase. All water connections are external. This unique design is especially suitable for use with high-temperature cooling systems.

**HEAVY-DUTY FRAME AND BASE.** Massive, one-piece frame and base are of heavy cast iron construction. Symmetrical design of base permits mounting of compressor cylinders on either one or both sides of engine.

**SIDE-BY-SIDE CONNECTING RODS** give lowest bearing loading—most rugged and reliable design. Pistons are fitted with full-floating wristpins.

**RETURN COUPON:** WORTHINGTON CORPORATION
Section E-75, Harrison, New Jersey

Please send me a copy of bulletin S-550-B27 outlining the advantages of the new turbocharged SLHC engine for gas handling operations.

NAME_____

COMPANY_____

ADDRESS_____

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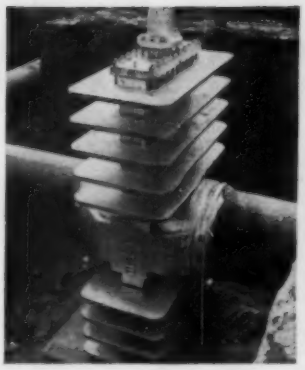
**For more details see your nearest Worthington district office or send coupon at right for descriptive bulletin S-550-B27, Worthington Corporation, Harrison, N. J. In Canada: Worthington (Canada) 1955 Ltd., Brantford, Ontario.**

Perfect through-conduit alignment simplifies hot tapping through this 22" ASA 600 valve.

34" full opening high pressure gas valve will stay bubble-tight underground—with no lubrication or maintenance.



Ease of operation is of prime importance on frequently used manifold installations.

# PERFORMANCE in the field points up the BIG DIFFERENCE

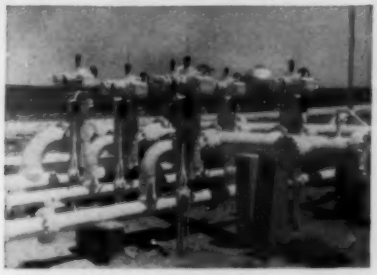
**—in bubble-tight seal you can check in the line**
**—in easier operation with no wedging or jamming**
**—in lower maintenance with no need for lubrication**
**—in through-conduit always in line with the line**

Thousands of pipeline, manifold and storage installations in gas and liquid services are daily adding to the record of performance that makes Grove *Seal-O-Ring* Gate Valves stand out as the practical answer to operating problems. If you have any doubt, ask men who are using them. It will pay you to specify Grove *Seal-O-Ring* Valves with the fabricated steel body—2" to 36"—in any standard pressure. Call your Grove representative or write today for details.

## THE WHOLE VALVE IS RIGHT HERE

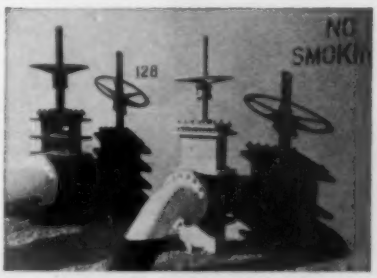
When valve is full open or closed, bubble-tight seals on both sides of the gate completely isolate line pressure in the conduit. The body, serving merely as framework for operating mechanism and to prevent loss of product while gate is in motion, may be drained or vented to atmosphere when gate is open or closed. Integrity of seals can be checked any time by a tell-tale valve on the body.

703



Products manifold at pipeline station illustrates typical motor-operated *Seal-O-Ring* Valve application.

LPG tank-to-pipeline is critical service where it's well to be able to check seal in the line—any time.




Self-cleaning feature is particularly important on crude oil tank lines.

# GROVE SEAL-"O"-RING Gate Valves

SUBSIDIARY OF WALWORTH

**GROVE VALVE and REGULATOR COMPANY • 6529 Hollis St., Oakland 8, Calif.**
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# If you need it right on time...

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BARGES • MARINE REPAIRS OF ALL TYPES

By Glenn Taliaferro
Johnston Testers

**FOR MORE INFORMATION AT THE BOTTOM OF YOUR WELL**

# FIVE Important Points of D. S. T. Pressure Charts

The science of reservoir engineering is putting greater demand on the field engineer for understanding and interpretative knowledge of Drill Stem Test Pressure Charts. Technical reservoir information can be enhanced by utilizing drill stem test data.

Realizing there is a need for proper evaluation of such data, Johnston Testers is complying by furnishing to the industry a pressure chart combining both "expanded" time and "expanded" pressure. Figures A and B illustrate the same chart, Figure A having the advantage of "expanded" time and "expanded" pressure to aid in the interpretation. By placing Figure A on a *reduced time* scale and removing the *extra inches* of deflection Figure B is produced.

Although Figure A presents a rather complicated appearance, it is simplified by realizing that

1. The chart progresses from right to left and that
2. When a pressure line reaches the left extremity of the chart it will reappear AT THE SAME PRESSURE READING ON THE RIGHT SIDE.

*Points of interest on Figure A*

1. Initial hydrostatic mud pressure.
2. Initial flowing pressure.
3. Final flowing pressure.
4. Final shut-in pressure.
5. Final hydrostatic mud pressure.

Reading from right to left, the pressure chart indicates the build-up hydrostatic pressure as the testing assembly is lowered in the hole. Upon reaching bottom the initial hydrostatic head of the mud column is recorded in pounds per square inch as indicated at point "1".

With the testing assembly on bottom, weight is applied and the packer is expanded isolating the desired test zone.

After the packer expands, the test tool opens exposing the test zone to the conditions in the drill pipe. This allows the pressure to drop from the initial hydrostatic mud pressure at point "1" to the initial flowing pressure at point "2" and with this decrease of pressure on the test interval, the fluid in the formation is permitted to flow into the well bore.

As the fluid flows from the formation through the perforated anchor and into the drill pipe, the pressure recorders accurately record the increase of pressure from the initial flow pressure at point "2" to the final flow pressure at point "3".

Any changes in pressure during the flow period will be recorded whether they are caused by tool manipulations or formation characteristics and will be easily identified on the flow curve. Examples of these pressure changes during the flowing period could be changing chokes at the surface, partial or complete plugging during the test, operating the equalizing valve to unplug the test tool.

After the well has been flowing for the desired length of time, the shut-in valve in the testing assembly is closed by rotating the pipe to the right. The small volume in the tester assembly from the shut-in valve to the bottom of the hole allows a rapid build-up toward the formation or reservoir pressure and the final shut-in pressure is recorded at point "4".

After the shut-in period is completed the equalizing ports are opened, allowing the mud to flow below the packer, facilitating easy removal of the packer from the packer seat. As the mud equalizes below the packer, the pressure increases to the final hydrostatic mud pressure at point "5" and as the tester is removed from the hole the chart shows the decrease in pressure and returns to the base line as the test tool reaches the surface.

All the pressures measured and recorded are due to the "actions" of various fluids encountered or controlled by the Tester. Mechanical operations, such as sudden changes in running speed, jarring, and so on, will record as vertical lines (pressure) very short time intervals. These lines will not confuse the actual test pressures as they are readily recognized as forces other than those caused by the formation.

**For more comprehensive interpretative data write Johnston Testers for the booklet entitled "The Interpretation of Drill Stem Test Data."**

FIGURE A

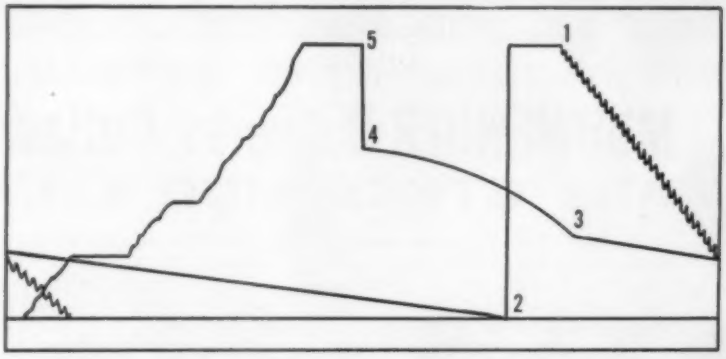
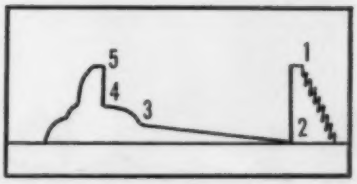



FIGURE B



GLENN TALIAFERRO
Manager of Chart Dept.
Johnston Testers
Houston, Texas

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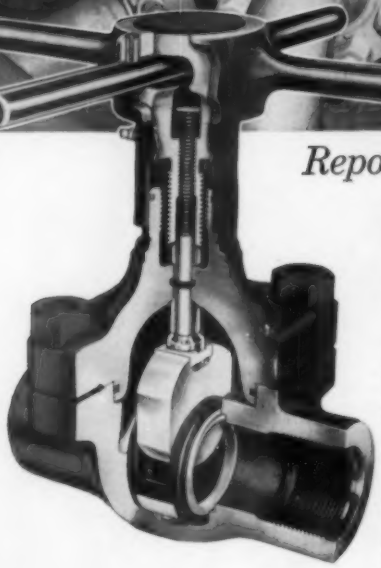


*Reports from everywhere prove—Rockwell Built*

# MUDWONDER Outworks, Outlasts ANY OTHER MUD VALVE!

You, like S. T. "Buck" Dotson (above), toolpusher on Big Chief Drilling Company, Rig. No. 32, will be convinced that your best mud valve buy is MUDWONDER once you've tried it.

Here is a mud valve that was designed, built, and sold for one purpose—to handle oil drilling muds efficiently and economically regardless of the sand content or lost circulation material. It's a big order, but MUDWONDER valves take it in stride.

Big Chief was one of the drilling companies selected to do the original MUDWONDER field testing several years ago. The crew members of Rig. No. 29 on which the test valve was installed were told to use, abuse, and prove the MUDWONDER on their toughest service.

Now, reports from all over the U.S.—overseas, too—prove that MUDWONDER valves can take harsh treatment and still outperform, outlast other mud valves.

That's why every contractor and toolpusher who has tried the MUDWONDER insists new rigs be equipped with MUDWONDERS and old rigs have MUDWONDER replacements.

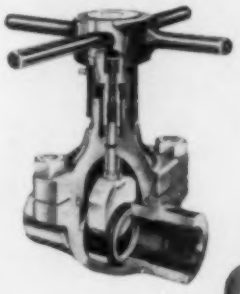
**Edward Valves, Inc.**

# Why The MUDWONDER Gives Mud Valve Economy

A hard chrome gate which is separate from the stainless steel stem plus a buna-N(Hycar) seat insert integrally molded over steel wear rings combine to resist abrasion—give long, dependable service.

In addition MUDWONDER provides seven other big operating advantages:

- **Keeps mudlines intact**
- **Operates easier, faster**
- **Seals drop tight**
- **Stops sanding**
- **Cuts maintenance**
- **Slashes downtime**
- **Assembles easily**



Here is the wear-absorbing heart of the MUDWONDER. Hard-chromed gate in combination with buna-N seat molded integrally over steel wear rings resist abrasion.

## *EASY TO INSTALL... EASIER TO MAINTAIN*

Longer wearing parts which can be replaced easily and quickly are causing the big switch to Rockwell Built MUDWONDER by cost-conscious drillers.

Whenever maintenance is needed, the operation is simple. Bonnet assembly lifts off without disturbing the mudline hook-up.

Inspection or part replacement, if necessary, can be made while the crew is making a connection. Extra seats and, perhaps, a gate for each size—both are interchangeable between pressure classes—are all the parts inventory you should need.

Drilling men have tried MUDWONDER—even abused it—to prove its economical superiority for installation, operation and maintenance. As a result, drilling men everywhere are replacing troublesome mud valves with MUDWONDER.

Ask your favorite oil field supply store for complete information, or write, call, wire Edward Valves, Inc., East Chicago, Indiana. Shipments are made from East Chicago or the Edward Houston warehouse at 1606 Maury St. through the supply store you select.

**Edward Valves, Inc.**
**Subsidiary of**
**ROCKWELL MANUFACTURING COMPANY**
**1212 West 145th Street**
**EAST CHICAGO, INDIANA**

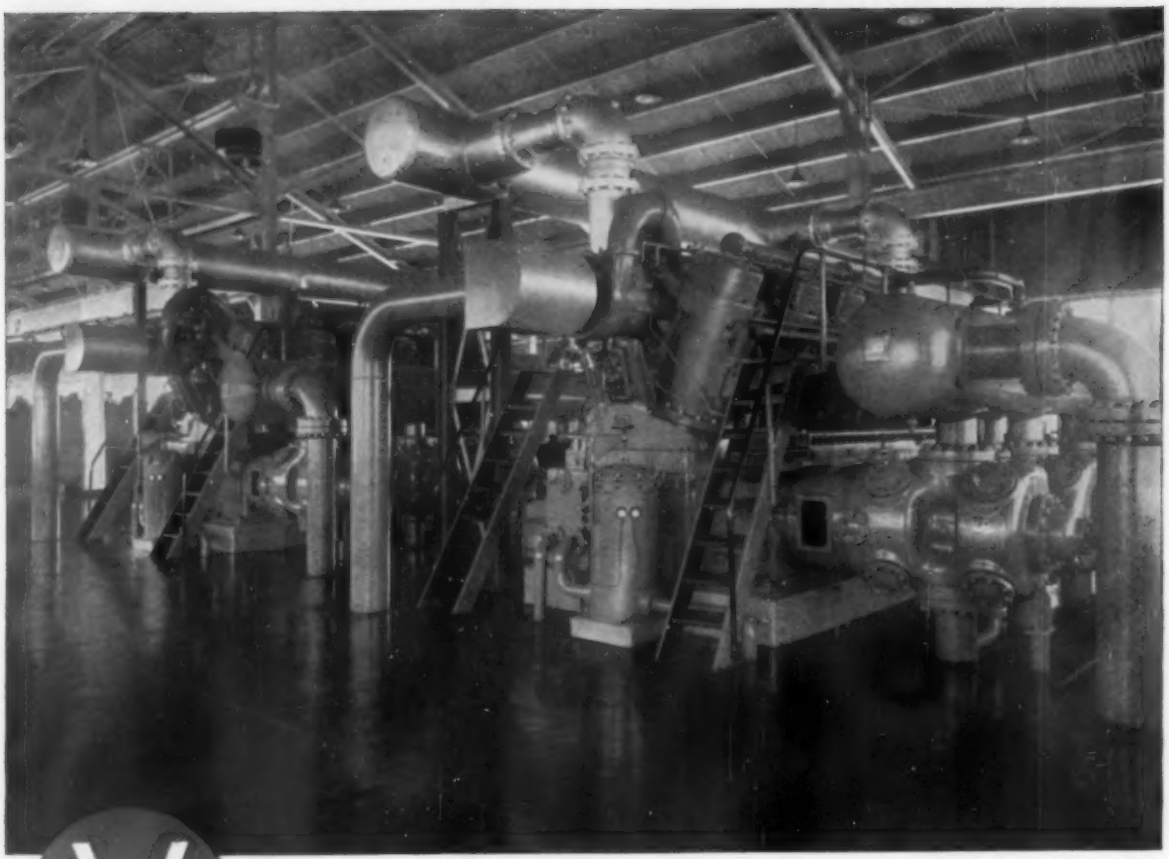
Send me your latest MUDWONDER catalog and price list for 3000 psi WP (6000 psi test) and 2000 psi WP (4000 psi test) mudline valves.

Name_____

Company_____ Title_____

Address_____

City_____ Zone_____ State_____



4-CYCLE

# KVS compressors are chosen for Palmyra Station of Northern Natural Gas Co.

When the Northern Natural Gas Company recently expanded its transmission station at Palmyra, Nebraska, two 2000-hp Ingersoll-Rand turbocharged KVS gas-engine compressors were put on the line to handle the capacity increase. An additional 2000-hp KVS unit is scheduled for installation at Palmyra this year.

These new 4-cycle units offer substantial fuel savings over older-type engines, floor space requirements are much smaller, and the operators appreciate the quiet operation.

Other significant features that go with the KVS include the flexibility and smooth operation characteristic of a 4-cycle unit, and the efficiency and dependability of I-R compressor cylinders with Channel Valves*.

Northern Natural was familiar with Ingersoll-Rand equipment, because there are over 75,000 hp of I-R gas-engine units at other stations of Northern and its subsidiaries. Other I-R products at Palmyra include the 4-cycle gas-engine generating units, the starting-air compressors and the cooling-water pumps.

Ingersoll-Rand equipment offers many important advantages for pipeline service. Ask your I-R representative for the complete story.

*Only I-R compressors have CHANNEL VALVES

Known for high efficiency, quiet operation and exceptional durability. Entirely different. Each valve is a combination of rigid stainless-steel channels and leaf springs, with trapped-air spaces which cushion action.

**Ingersoll-Rand**

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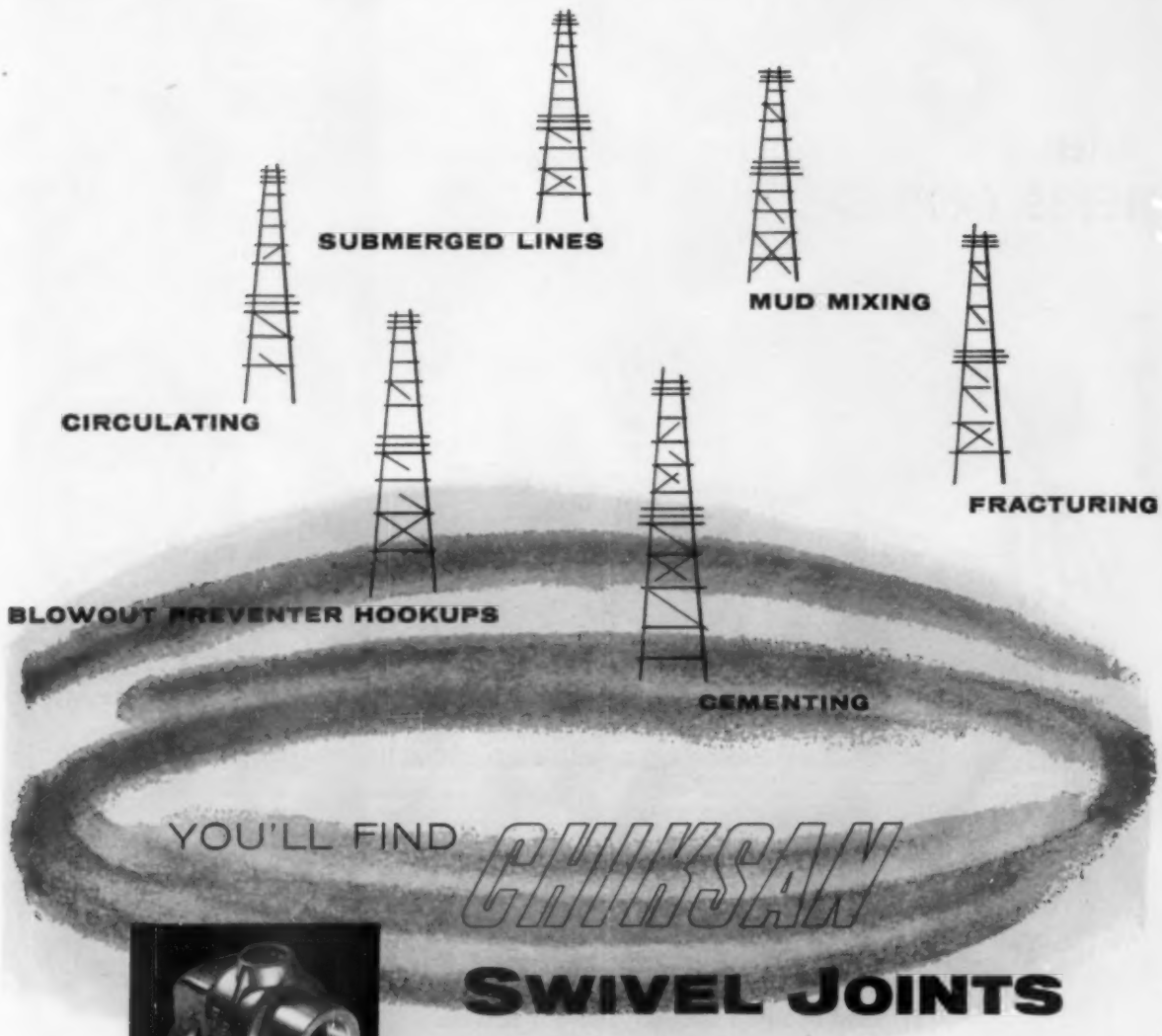


YOU'LL FIND CHIKSAN

## SWIVEL JOINTS

From rotary hose to submerged lines, on rigs all over the world, it's a safe bet you'll find Chiksan Swivel Joints in service. The reason for this is simple. Oilmen know from years of experience they can rely on Chiksan to deliver dependable performance under the most rugged conditions. They know too, that Chiksan Swivel Joints save rigging up time, prevent line vibration fatigue, permit flexibility in positioning pumps and tanks. Small wonder then that wherever you find oil, you'll find Chiksan Swivel Joints.

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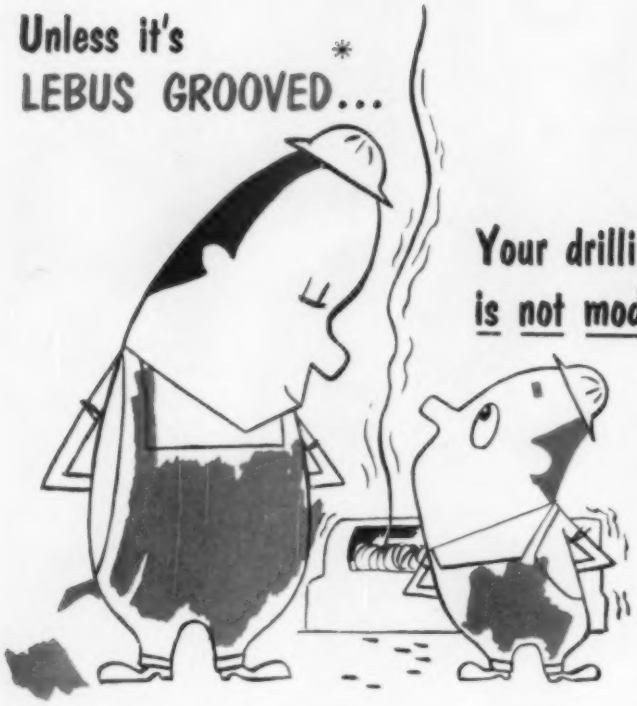
## Unless it's * LEBUS GROOVED...

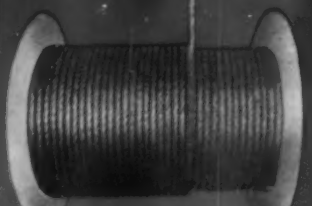


**Your drilling hoist is not modern!**

Being modern is a prerequisite now when it comes to drilling rigs. Producers are calling on those operators who stay in front by utilizing the latest developments in drilling equipment. LeBus Grooving and Spooling Systems* make it possible for the operator to have a more modern rig by increasing efficiency, allowing up to 40% deeper drilling with your present rig, faster spooling of wire line, elimination of drum and drawworks vibration and wire line whip caused by bad spooling, which adds up to hundreds of dollars in savings monthly for the rig operator. Modernize your rig through LEBUS GROOVING!*

*LEBUS COUNTERBALANCE SPOOLING

PERFECT SPOOLING "COUNTERBALANCE"



*The World's Most Perfect Method of Spooling Wireline*

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Patent Nos.: Counterbalanced Spooling, Nos. 2,734,695; 2,732,150. Controlled Parallel and Helical Spooling, Nos. 2,708,080; 2,620,996. Appli. of grooving, Nos. 2,399,926; 2,204,938. Removable End Fillers, No. 2,216,819. Other patents pending.

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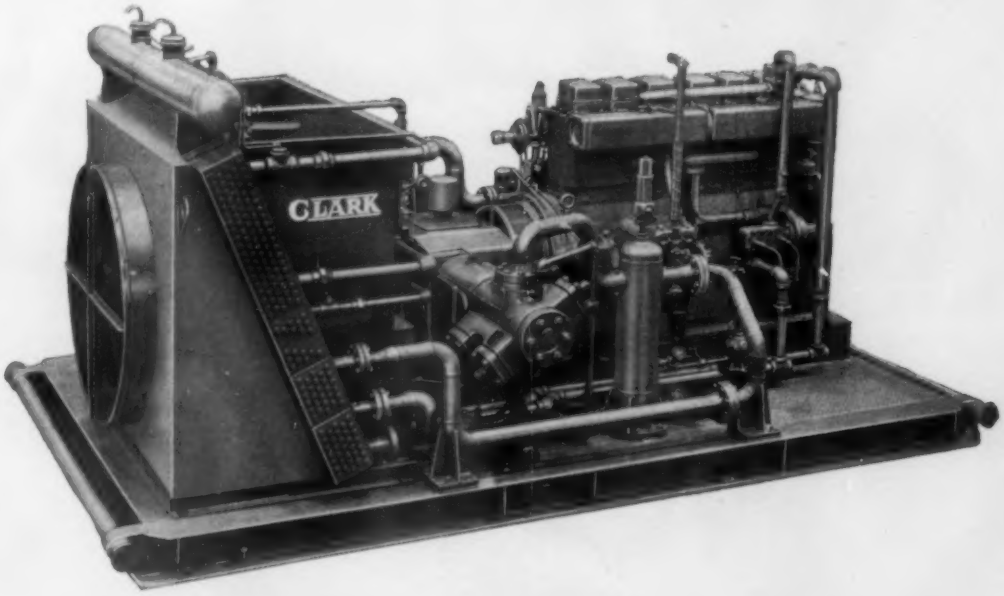


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## A unique feature of the Clark CFA Packaged Field Compressor

One of the simplest ways to take the bugs out of packaged field compressors is to direct-couple the compressor to the engine. Clark engineers did exactly that when they designed the new CFA. Troublesome, power-robbing belts and gears between the engine and the compressor are not required. A simple rubber block coupling takes their place. But this achievement was made possible only because the CFA is so perfectly balanced and therefore can operate at a modern 1,000 rpm. without a quiver or a shake. Furthermore, the CFA is typically Clark. It has the built-in stamina and precision of its big brothers. You'll deplete the field, but you won't wear out the Clark compressor.

There are two and four cylinder CFA models available in the 100-350 bhp. range. Your nearest Clark representative has all the facts and can tell you of other operators' experiences with the CFA.

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# 245 hours less greasing time...
# 245 hours more profit time EVERY YEAR!

Time saved by 1,000-hour lubrication intervals on your Allis-Chalmers tractor adds up to 245 hours every year—an extra month of production!

On truck wheels, support rollers and idlers, an exclusive combination of positive, spring-loaded seals and tapered roller bearings keeps out dirt and moisture, prevents loss of lubricant.

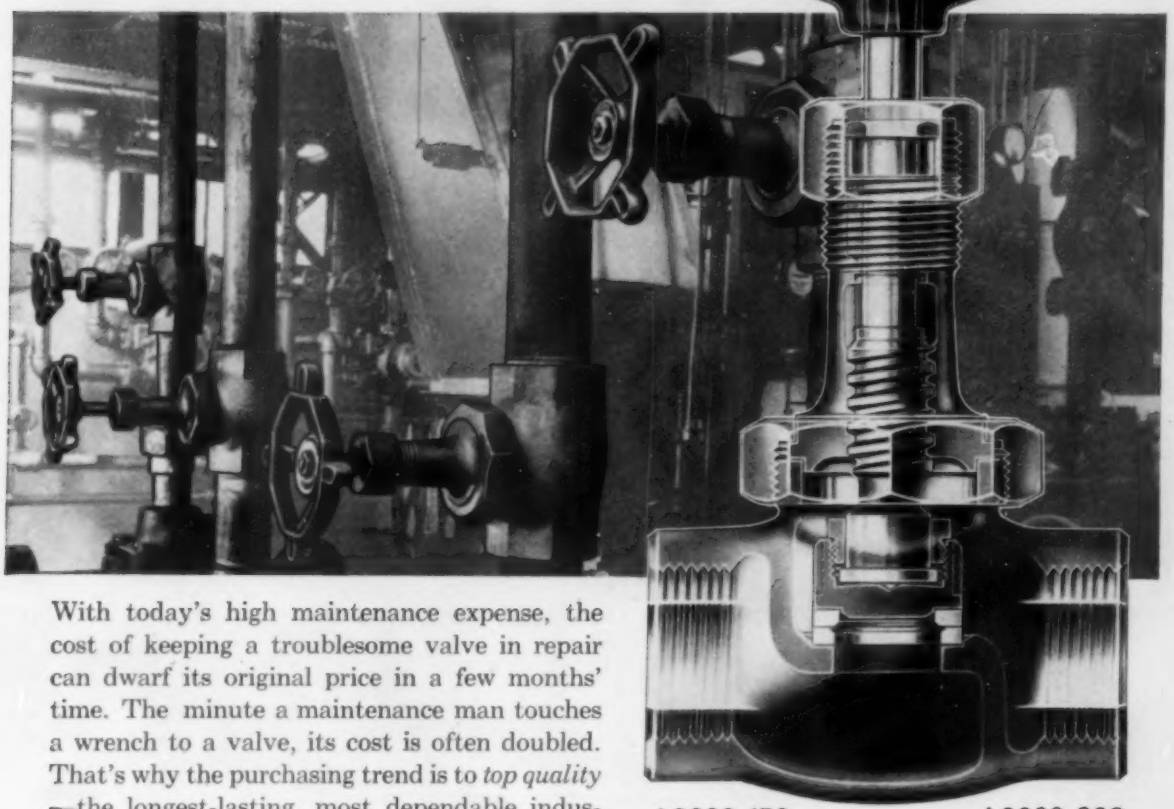
For 1,000 tractor work hours, you can forget about every grease point below track level. When it's time for servicing, simple low-pressure flush lubrication replaces old grease completely, eliminates seal popping, prevents damage to seal faces. Allis-Chalmers, Construction Machinery Division, Milwaukee 1, Wisconsin.

## IT'S SIMPLE ARITHMETIC!

| | Other Tractors | Allis-Chalmers Tractors |
|---|---|---|
| No. of greasings per year (5,000 hr) | up to 500 | 5 |
| Greasing time (av. conditions) | ½ hr | 1 hr |
| Time spent greasing | up to 250 hr | 5 hr |
| PRODUCTION TIME GAINED . . . 245 HOURS EVERY YEAR! | | |

**ALLIS-CHALMERS** *Engineering in Action*

# You Can't Find the Cost of a Valve on a Price List



With today's high maintenance expense, the cost of keeping a troublesome valve in repair can dwarf its original price in a few months' time. The minute a maintenance man touches a wrench to a valve, its cost is often doubled. That's why the purchasing trend is to *top quality* —the longest-lasting, most dependable industrial equipment on the market. And in the valve field, that means Lunkenheimer . . . famous for quality and maintenance-free service since 1862. The Lunkenheimer Company, Box 360 Annex Station, Cincinnati 14, Ohio.

**The cost of a Lunkenheimer Valve gets smaller...and smaller...and smaller... with each passing year of dependable service**

**LQ600-150**
150 lb. S. P.
300 lb. W. O. G.

**LQ600-200**
200 lb. S. P.
400 lb. W. O. G. 550°F.

¼ to 2 inches

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**"The Evidence in the Case"**
*Review Actual Case Histories from the Files of Industry on*
**HOW TO CUT MAINTENANCE**

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**American Tidelands, Inc.**
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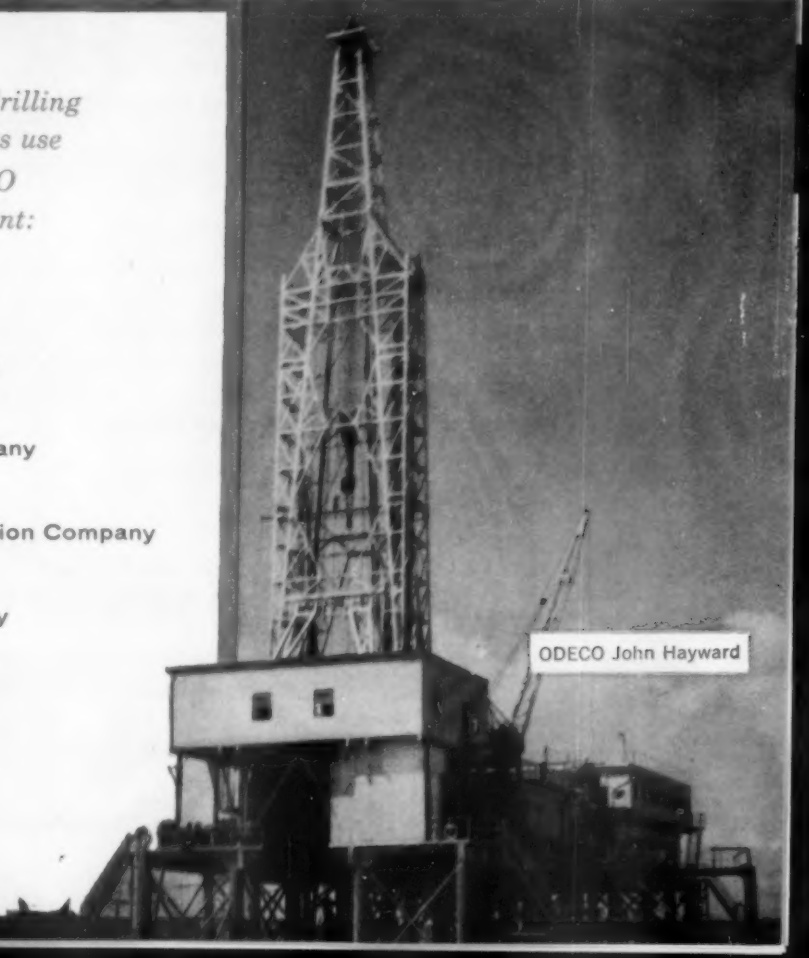
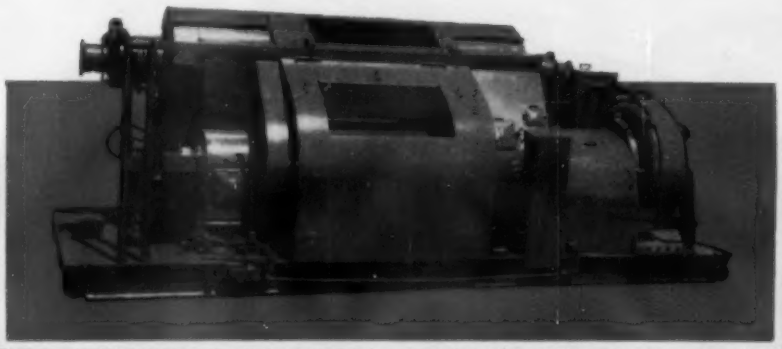


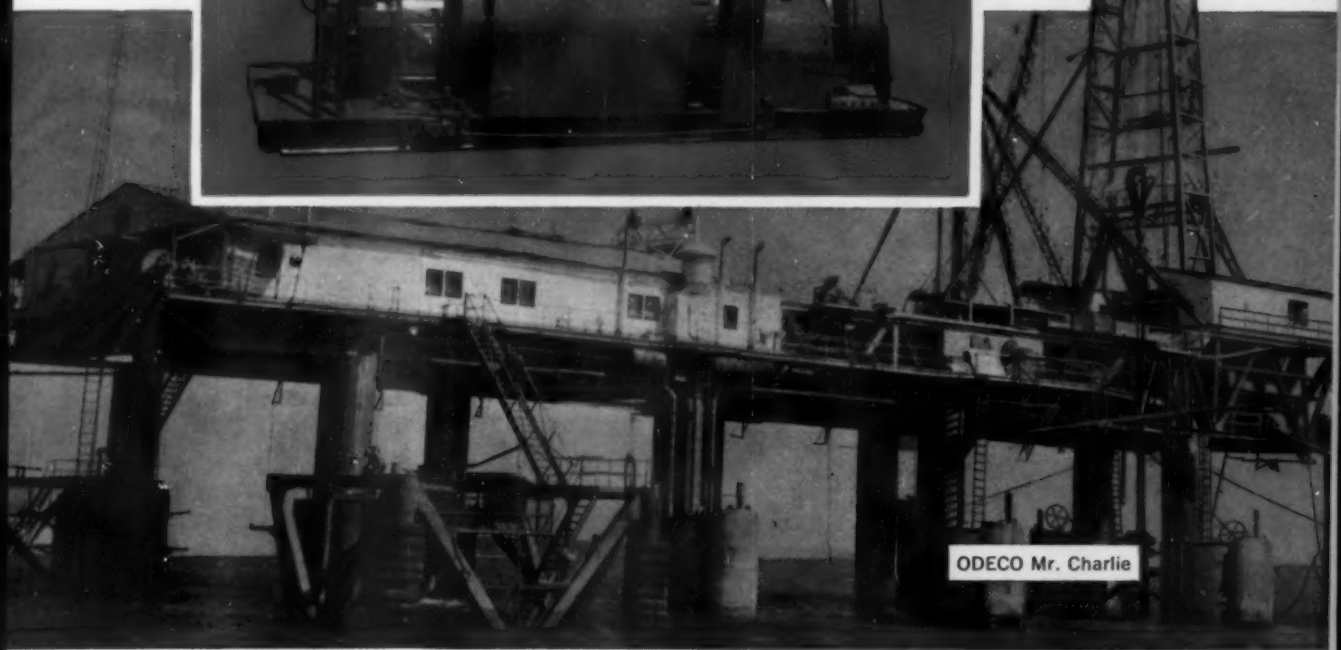
# SALUTES OFFSHORE DRILLING

Offshore deep drilling is simplified through modern rugged Continental-Emsco drilling machinery. The Continental-Emsco all-electric "E" series drawworks is the very latest in a single package with integral motors according space-saving economy in a compact deep drilling rig. PJ 27½" cone roller bearing rotary table, L-400 heavy duty true cone roller bearing swivel, MA series crown and traveling blocks are all companion equipment capable of handling offshore deep drilling responsibilities twenty-four hours a day. Continuous uninterrupted service means an economical profitable well completion to both the operator and contractor.

*Check these outstanding Series "E" Drawworks Features*

1. Four Speed Drawworks 2. Built-in electric motor package 3. Totally enclosed pressure lubricated drives 4. 60" brake rims with total effective braking area of 2,640 square inches 5. Optional built-in Sandreel





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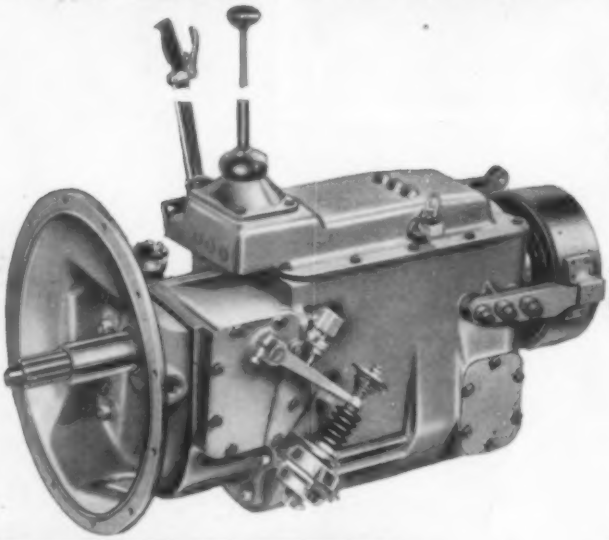
R-605

# Ideal for Highway Hauling-
# CLARK stepMatic Transmission



Here's happy and profitable news for all operators whose truck equipment takes punishment—Clark's stepMatic Transmission. This transmission has proved particularly ideal for long-haul, high-speed operations.

- Ten speeds—splitting ratios in between the normal 5-speed transmission ratios—giving 28% steps to fit every hauling need.

Transmission gears synchronized. Semi-automatic shift for the splitting ratios

- Full control of gear-shifting at all times.
- Spares engine—the right ratio for every grade prevents engine lugging—decreases hauling time and fuel consumption.
- Increases transmission life—reduces shock loads. Less downtime for repairs.

By all means write for full information on this highway-proved achievement of Clark engineering.

**CLARK® EQUIPMENT**

TRANSMISSION DIVISION

**CLARK EQUIPMENT COMPANY**

Falahee Road • Jackson 15, Michigan

"BS&B Research Shows The Way!"

# Whatever Your Lease Liquid Metering Requirements

Metering Separator

Metering Chamber

## There Is A BS&B Metering Chamber, Metering Tank, Metering Treater or Metering Separator For The Job!

For today's rapidly developing trend to oil lease automation, BS&B offers a complete line of fully automatic liquid metering equipment to meet every lease requirement. Any of the following items of equipment may be used independently — or as an integral part of the recently announced new BS&B "PHANTO-MATIC" Lease System:

1. **BS&B VERTICAL VOLUMETRIC METERING SEPARATORS, MODELS D OR E** — Incorporates volumetric dump metering of oil with gas-oil separation.
2. **BS&B SPHERICAL METERING SEPARATORS, MODELS D OR E** — Combines the highly efficient separation characteristics of the BS&B Spherical Separator with those of an accurate metering chamber.
3. **BS&B METERING TEST TREATER, TYPE VMT** — Combines a standard BS&B Emulsion Treater with Volumetric Metering Chambers to provide accurate metering of oil and water produced from wells being tested.
4. **BS&B LOW PRESSURE SPHERICAL METERING CHAMBER, MODEL B** — An accurate, low cost method of measuring lease produced liquids from standard lease separators or treaters.
5. **BS&B "HI-AC" METERING CHAMBER** — Accurate, economical and positive metering for lease produced liquids. Metered volume lies between valve seats. Variation in float chamber levels does not affect metered volume.
6. **THE BS&B METERING TANK** — Volumetric Metering Tanks with metering control systems of extreme accuracy, capable of handling *any* amount of lease production.

**OUTSTANDING FEATURES COMMON TO ALL UNITS:**

1. Compact in design for easy hook-up.
2. Available with either pneumatic or electro-pneumatic controls.
3. External adjustments on controls can be easily made without shutting in the unit.
4. All controls and valves are designed to fail-safe.
5. Controls are enclosed in tamper-proof housing.

Why not plan now to install BS&B Metering Equipment on your lease? Your BS&B Man will be glad to call and give you full details. Or you may write to . . .

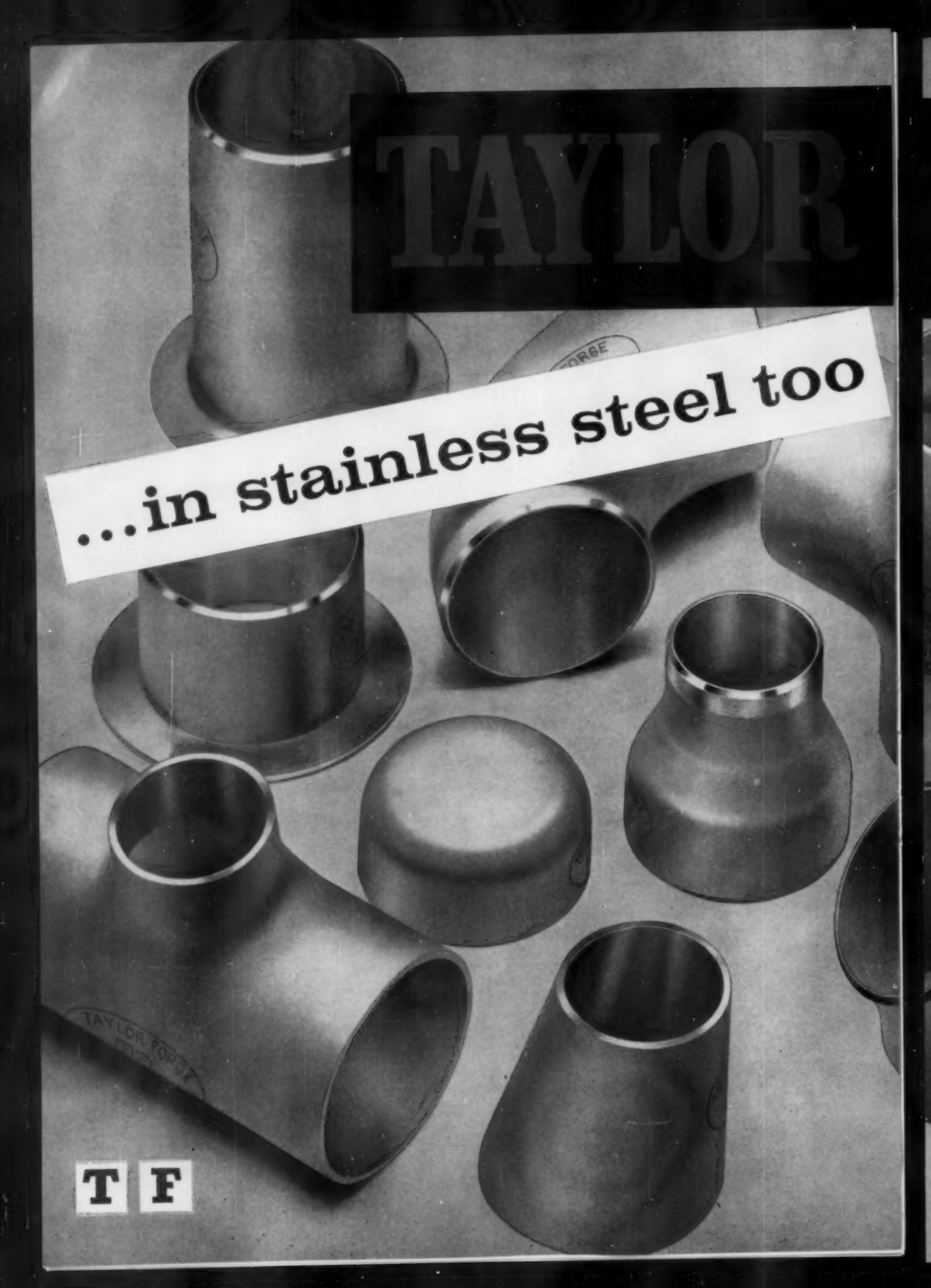
EFFICIENCY OVER 60 YEARS BS&B RELIABILITY

ANOTHER EXAMPLE OF PRODUCT LEADERSHIP

**BLACK, SIVALLS & BRYSON, INC.**

Oilfield Equipment Division, Dept. 1-A68

P. O. Box 1714 Oklahoma City, Oklahoma


TAYLOR
...in stainless steel too
T F

# FORGE Welding Fittings and Forged Flanges

**The complete line . . . the quality line . . . whatever you need . . . here it is . . .**

* Schedules 5S—10S—40S—80S as well as all sizes and thicknesses covered by Standards in carbon steel.

* Seamless* WeldELLS—Tees—Reducers—Lap Joint Stub Ends—Caps—Crosses—Flanges—regularly furnished in stainless steel types 304—304L—347—316—316L. Details regarding other types of stainless and corrosion resistant alloys gladly supplied upon request.

*NOTE: Schedules 5S and 10S 90° and 45° WeldELLS are furnished seamless in sizes through 6". Schedules 40S and 80S are furnished seamless in all sizes.

**...TRADITIONALLY DEPENDABLE**

## Taylor Forge & Pipe Works

General Offices and Works: P. O. Box 485, Chicago 90, Illinois
Plants at: Carnegie, Pa., Gary, Ind., Houston, Texas, Fontana, Calif., Hamilton, Ont., Canada
District Sales Offices: New York, Boston, Philadelphia, Pittsburgh, Atlanta, Chicago, Houston, Tulsa, Los Angeles, San Francisco, Seattle, Toronto, Calgary.

*To take full advantage of both product excellence and fine service, patronize your local Taylor Forge Distributor.*

# TORQMATIC spells bigger profits on trailer-mounted drilling rig

- *2 years, 9 months without overhaul*
- *Complete rig moves on 8 trucks*
- *Power unit stays within 8-ft. limit*

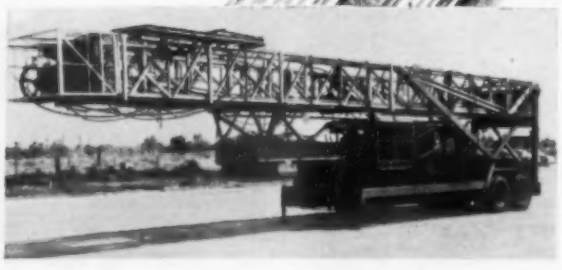
The operating record speaks for itself.
59 wells—over 200,000 feet of hole drilled over 2 years and 9 months, and no overhaul!

This Cooper D-50 drilling rig, operated by the Rusty Walters Drilling Co. of Bakersfield, California, marks a milestone in economical trailer-mounted rigs.

It is rated at 240,000 pounds working out of a 100′ Bender mast. Power is supplied by twin GM 6-71 engines, each driving through an Allison TORQMATIC Converter into a TORQMATIC Transmission.

The average rig of this capacity requires 12 trucks to move. This rig only 8. Because the draw works and rotary-table drive can be close coupled, it can stay within the 8-foot highway limit. The TORQMATIC Converter is the *only* converter permitting this close coupled design.

For more profit in oil-field operations, get the Allison TORQMATIC story. Ask your equipment supplier, or write: Allison Division of General Motors, Box 894R, Indianapolis 6, Indiana.



GM TORQMATIC Allison

TORQMATIC DRIVES

**TYPE 657A**

Double port globe body for conventional service. Also supplied single port where tight closure required. Normally supplied in iron or steel in sizes ½" thru 12".

**TYPE 657YY**

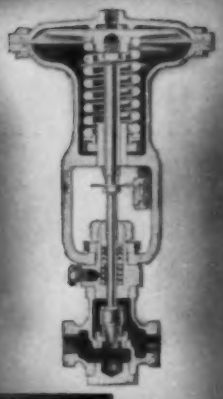
Three-way control valve for by-pass or blending service. Eliminates need for two globe type control valves. Available all castable alloys sizes ½" thru 12".

# FISHER®

## "Has the control valve for your plant

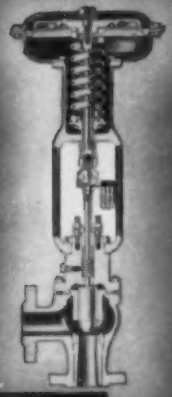
**TYPE 667Z**

Split type body in which parts are readily accessible; can be economically supplied in various alloys for corrosive service. Available in flanged sizes ½" thru 2".



**TYPE 510G**

Small and compact bronze control valve for relatively light service. Available in screwed sizes ½" thru 2".



**TYPE 657-458**

Angle control valve for handling fluids containing solids, or flashing liquids which are erosive. Normally supplied in steel flanged ends in sizes 1" thru 6".

**TYPE 657–SAUNDERS**

Fisher operator on Saunders patented valve is widely used on "hard to handle" fluids which are viscous and/or corrosive. Available in wide variety of materials in sizes ½" thru 6".

**Special design bodies for process services**

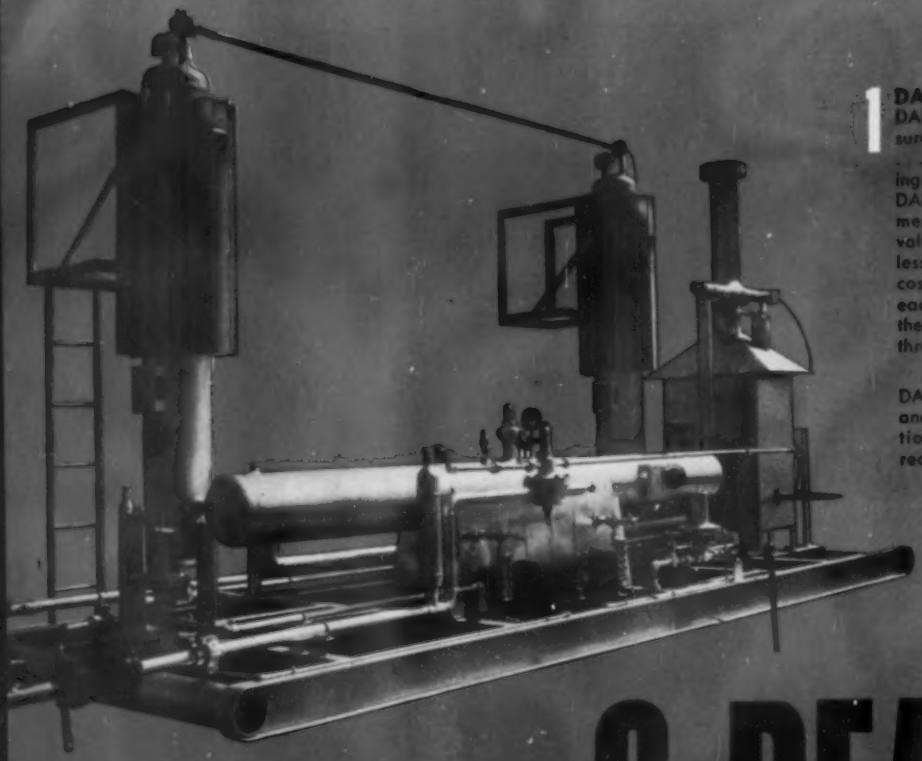
**Wide selection of sizes and available in all castable alloys**

**Supplied with improved diaphragm operator that provides accurate valve response**

**FISHER GOVERNOR COMPANY • MARSHALLTOWN, IOWA**

**CANADIAN PLANT: WOODSTOCK, ONTARIO**

LEADS THE INDUSTRY IN RESEARCH FOR BETTER PRESSURE AND LIQUID LEVEL CONTROL



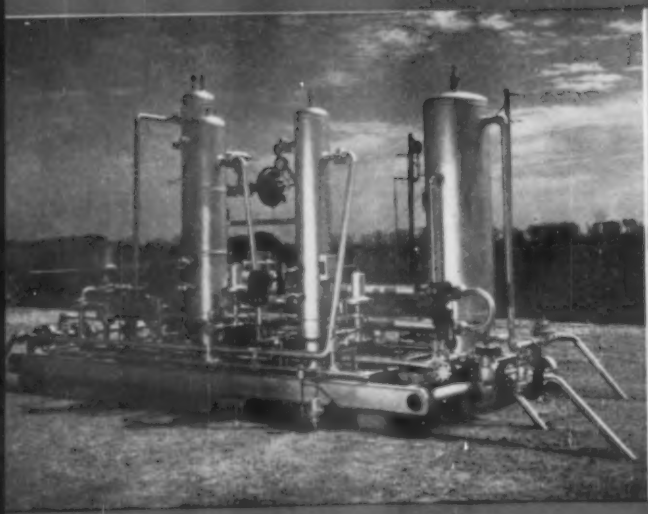
**1** **DAU . . . a Parkersburg exclusive! With DAU, wellhead dehydration of high pressure gas wells is possible for the first time . . . and with real economy, too. Your savings start with the low cost of unit. The DAU requires no costly auxiliary equipment such as separators, piping and valves. Because the DAU uses 80 per cent less fuel gas, your savings on operating costs can amount to hundreds of dollars each month. And checking corrosion at the wellhead saves on equipment wear throughout the flow system.**

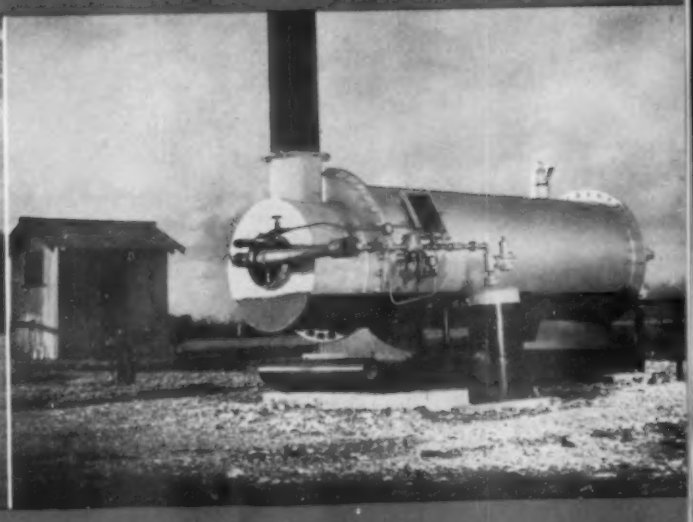
**Available in two basic types: (1) The DAU Weldrier for wellhead dehydration; and (2) The DAU Welsorber for combination dehydration and hydrocarbon recovery.**

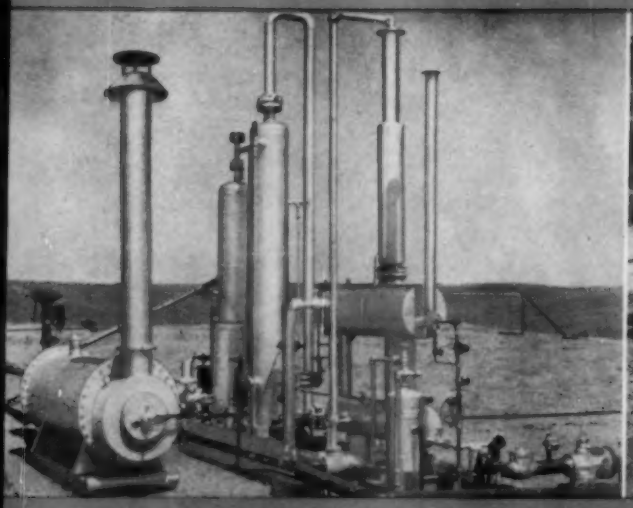
# 6 REASONS

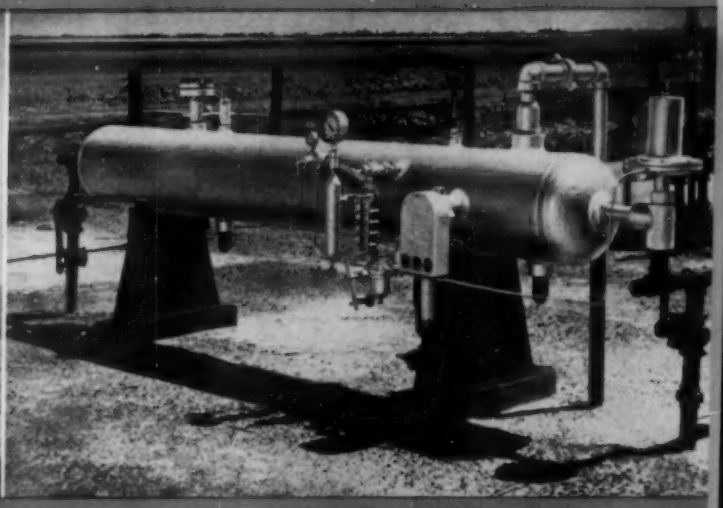
**2** **HYRECO . . . another significant Parkersburg development. Parkersburg pioneered the design and development of this equipment to obtain high recovery rate by cold separation. Top performance attained through such Parkersburg features as use of horizontal and vertical separators to isolate warm liquid zone from cold gas zone for maximum recovery and minimizing danger of freezing; vertical knockout for complete removal of liquids before well stream enters cold zone of high pressure separator; and liquid level controller, used to regulate elimination of hydrocarbons from warm zone of separator, that gives hair trigger sensitivity, freedom from freezing, and freedom from plugged bleed holes. Available in capacities from 2.5 to 15 MMCF/D; pressures from 2000 to 6000 psi with either single tube or twin tube vertical knockout for liquid removal.**

**3** **HEATERS . . . superior quality and performance. Parkersburg heaters are available in both direct fired and indirect heater types with capacities from 90,000 to 4,000,000 BTU's. Exclusive heating tube design eliminates hot spots and scale deposits, gives more efficient, economical and dependable service. Indirect heaters now feature new, modern jet-type burner and pilot that requires no air-fuel adjustment, gives maximum flame stability because only primary air is used with fuel gas, and, because of design of wall-tight burner box and flame stability, is practically immune to ill effects from crosswinds. Finest auxiliary control equipment available insures peak effectiveness. All valves and regulators used on Parkersburg heaters are designed for oil field application.**









**4** **GLYCOL TYPE GAS DEHYDRATOR** ...a self-contained, completely automatic unit that will eliminate most hydrate problems. Proven performance in extremely cold temperatures. Economical operating cost, using natural gas as source of power. Available in standard sizes to handle up to 10,000 MSCFD and up to 1500 psi operating pressure.

**5** **OIL AND GAS SEPARATORS** . . . available in vertical and horizontal types. Parkersburg single-tube separator gives more gas flow area, more interface area and more retention time for greater separation. Whether your need is for a single-tube, two stage, three phase, vertical or metering separator, there is a Parkersburg separator to fit your requirements.

# WHY

## *Parkersburg*

## Is the First Name in Production Processing Equipment

We are known by the equipment we keep. Parkersburg production processing equipment is the recognized leader in the field . . . a leadership gained through pioneering new designs and applications of equipment to meet any field problem. Operators everywhere buy Parkersburg with confidence because they know the superior performance that is built into each piece of equipment. If it is a Parkersburg, it is designed right and built right for leadership and engineered to meet specific field conditions.

The Parkersburg representative in your area will appreciate the opportunity to discuss specific equipment needs with you.

**6** **EMULSION TREATERS**. . . designed to cover a wide range of applications. Safe and easy to operate. Equipped with unitized fuel gas control line and wind-proof burner control hood. Large free-water knockout capacity, adequate oil settling height. You get more specific separation of emulsion into clean oil and water, greater maintenance of high gravity oil.

AT PARKERSBURG, QUALITY AND SERVICE HAVE GONE HAND-IN-HAND FOR 60 YEARS!

# *Parkersburg*

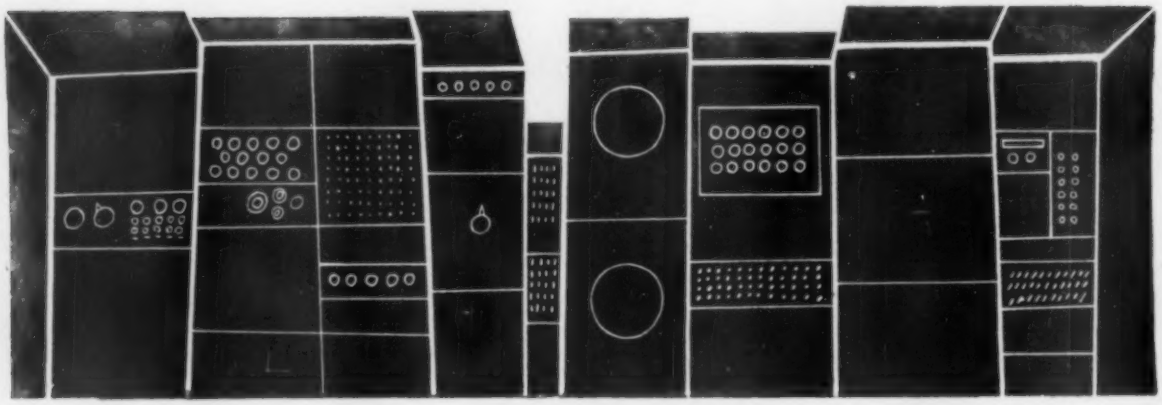
## RIG AND REEL COMPANY

3345 WINTHROP AVENUE • FORT WORTH 16, TEXAS

DIVISION OF PARKERSBURG-AETNA CORPORATION

PESA

*simple as a desk calculator...*



*intelligent as an electronic brain!*

*the* **e101**

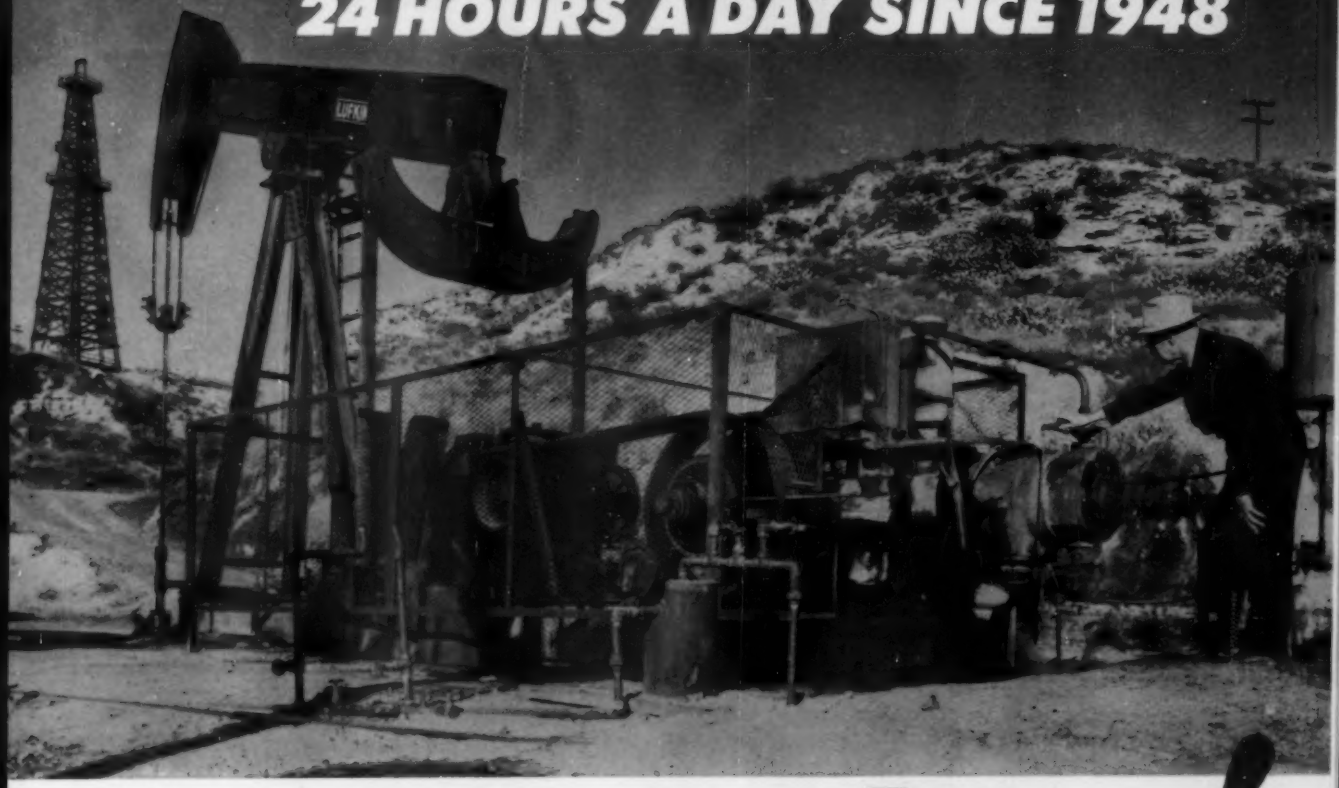
combines advantages of both . . . and solves the problems "in-between," at low cost and with big savings in technical man-hours. Pinboard programming – an exclusive feature of the E101 digital computer – can be mastered in six hours; familiar notations, no coding. That's why more E101's are *at work* than all other comparable computers combined. Immediate delivery; instant serviceability. As a test: send us one of *your* problems. We'll program it, send your solution and proof of how we can serve. For demonstration, or descriptive booklet, write:

**ElectroData**

Division of Burroughs Corporation
with world-wide sales and service facilities
460 Sierra Madre Villa
Pasadena, California

*for instance*

# This *Ajax* CM-11 x 14 has been running 24 HOURS A DAY SINCE 1948



## UNUSUAL? NO—JUST *Ajax!*

This is a typical AJAX workhorse on the job . . . steady, faithful, productive, making a lifelong habit of continuous daily service. Since beginning operation in 1948, the cylinder head has never been removed from the engine. • The facts are, AJAX Gas Engines work for less for longer, and they ought to be working for you. Your Supply Man will be glad to help plan an Ajax program for your particular needs. Call him.

AJAX

## GAS ENGINES

**AJAX IRON WORKS** CORRY, PENNSYLVANIA

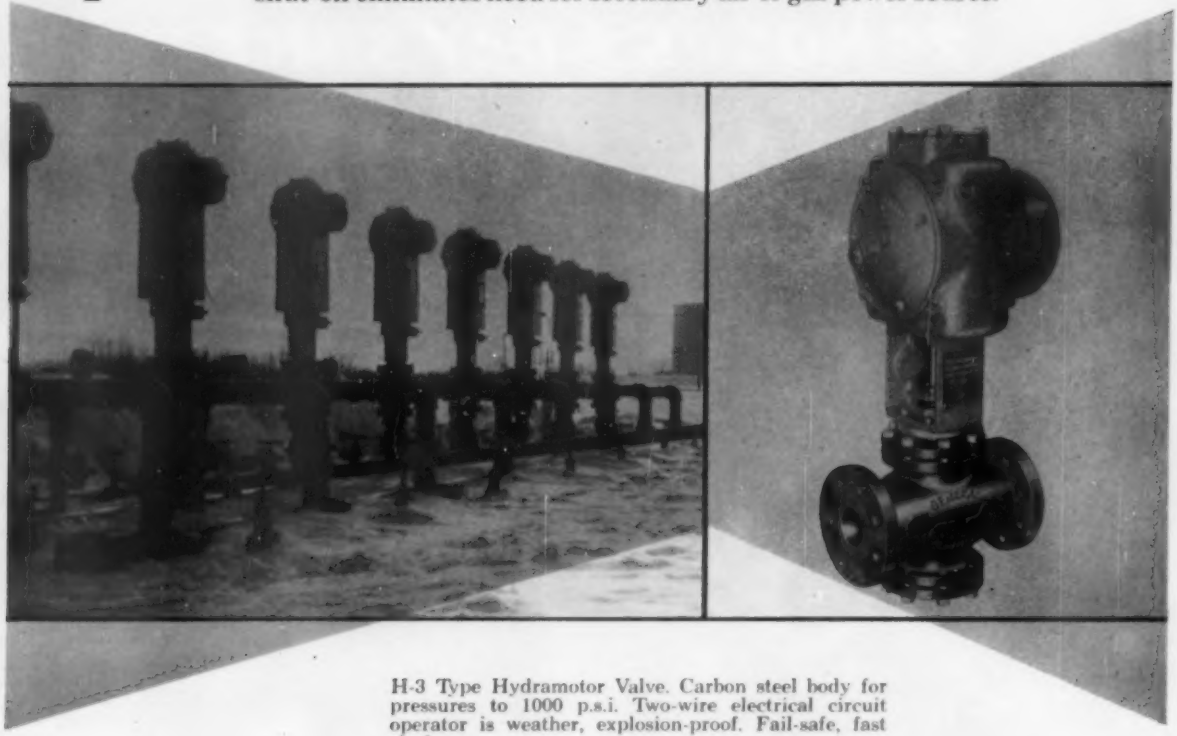
*Builders of* GAS AND OIL ENGINES, PRESSURE PUMPS, STEAM DRILLING ENGINES, INDUSTRIAL STEAM ENGINES

*Oil Field Distributors:* THE NATIONAL SUPPLY CO., PITTSBURGH, PA. • R. B. MOORE SUPPLY CO., BOLIVAR, N. Y. • BETHLEHEM SUPPLY CO., TULSA, OKLAHOMA

ADVANCED DESIGN — HYDRAMOTOR

# NO OTHER MOTOR VALVE OFFERS SO MUCH IN AUTOMATIC CUSTODY TRANSFER

Simple, two-wire electrical hookup with fast, positive shut-off eliminates need for secondary air or gas power source.



H-3 Type Hydramotor Valve. Carbon steel body for pressures to 1000 p.s.i. Two-wire electrical circuit operator is weather, explosion-proof. Fail-safe, fast closing.

For automatic shut-off, three-way control or tank switching operations, no other motor valve or controller can match the benefits from installing General Controls Hydramotor valves on remote tank and feeder line applications.

*Here's why:*

**No. 1** Hydramotor valves are simple, rugged electro-hydraulic valves that operate on simple, two-wire electrical circuits already available. No additional power source is necessary.

**No. 2** Hydramotor valves are *all-electric*, provide interlock without additional valves, yet they *fail-safe* on power interruption.

**No. 3** Hydramotor valves completely eliminate the need for extra piping, tubing, strainers, dryers and pilot valves. Overall system cost is much, much lower.

**No. 4** Hydramotor valves are simple, trouble-free. Maintenance costs are low . . . eliminated are worries about frozen control lines, leaks and blocks in lines and pilot valves.

**No. 5** Hydramotor valves laugh at weather. Desert heat or arctic cold, under conditions where attendants couldn't get to a manual valve, they're on the job 365 days a year, unattended and trouble-free.

WRITE TODAY FOR HYDRAMOTOR CATALOG 11, OR CONSULT NEAREST GENERAL CONTROLS BRANCH OFFICE LISTED IN YOUR YELLOW PAGES. CASE HISTORY OF EAST TEXAS INSTALLATION SENT ON REQUEST

Five Plants
Glendale, California
Burbank, California
Iron Mountain, Michigan
Skokie, Illinois
Guelph, Canada

**GENERAL CONTROLS**

*America's Finest Automatic Controls for Home, Industry, and the Military*

Factory Branch Offices Serving *All* Principal Cities of the United States and Canada

Rust-Oleum is distinctive as your own fingerprint. Accept no substitute.

. . . goes on faster, stops rust, lasts longer over rust!

## ONE MAN often does the work of two!

EASIER TO USE—because Rust-Oleum 769 Damp-Proof Red Primer goes over rusted metal after scraping and wirebrushing to remove rust scale and loose rust—usually eliminating costly surface preparations. *Stops Rust*—because Rust-Oleum's specially-processed fish oil vehicle *penetrates* rust to bare metal—driving out air and moisture that cause rust.

LASTS LONGER applied over rust—and teamed up with Rust-Oleum's many attractive finish coatings, assures lasting beauty. Try Rust-Oleum on *your* tanks, metal sash, machinery, wire fences, stacks, girders—or around *your* home. Prompt delivery from Industrial Distributor stocks. Write for illustrated literature with color charts showing colors and applications.

**RUST-OLEUM CORPORATION • 2479 Oakton Street • Evanston, Illinois**

# RUST-OLEUM®

**30% GREATER COVERAGE—MANY ATTRACTIVE COLORS**

Rust-Oleum covers up to 30% more area, depending upon surface condition and porosity. And you can beautify as you protect with Rust-Oleum finish coatings in Aluminum, White, Red, Gray, Green, Blue, Yellow, Black, etc.

## STOPS RUST!®

Rust-Oleum and Stops Rust are brand names and registered trademarks of the Rust-Oleum Corporation.

Write for special report showing Rust-Oleum penetration to bare metal.

# Qwik Change

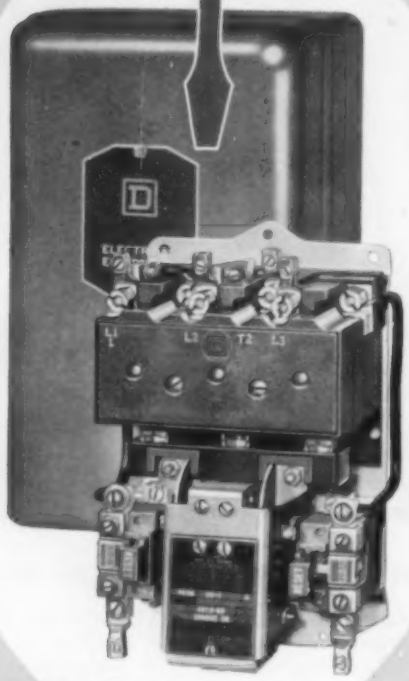
## with PACKAGED MOTOR STARTER PARTS!

**INTERLOCKS**

A wide variety of quick-change, front-mounted interlocks adds flexibility for special applications

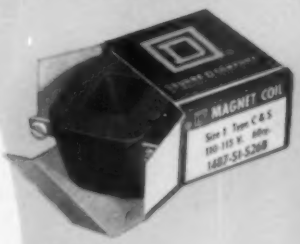
**CONTACTS**

Packaged replacement contacts are easily installed without disturbing wiring



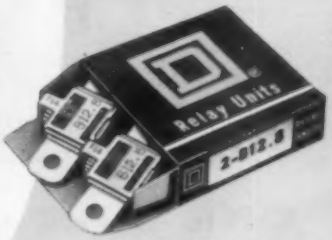
**PUSH BUTTONS AND SELECTOR SWITCH**

These Kits contain all parts necessary to make quick changes from standard starters to either push button or selector switch controlled devices




**COILS**

Screwdriver is only tool required for quick change of magnet coil to accommodate different voltages




**O. L. RELAYS**

A wide variety of easily selected, packaged overload relay heater units provides quick changes to meet varying requirements for overload protection

**EASY to Identify!**
**EASY to Buy!**
**FASTER to Install!**

NOW...EC&M PRODUCTS ARE A PART OF THE SQUARE D LINE!

SQUARE D COMPANY

**It's a real slick little tool that can save you a lot of fixed capital investment - and bother - each year.**

To obtain well pressure reading, insert master gauge with Connector in Gauge Valve and turn gauge 45 degrees. Gauge Valve opens automatically, exposing gauge to pressure. Remove gauge and Gauge Valve closes automatically.

**HERE'S HOW IT WORKS:** Instead of buying one or two pressure gauges for each Christmas tree, you buy just one master gauge *for an entire field.* Then, install these inexpensive Gauge Valves where you have been installing permanent type gauges—one on the tubing and one on the casing. Your Gauger takes the master gauge from well to well, stabs it into the Gauge Valve to obtain the pressure reading.

Only one gauge to buy.
No breakage.
No gauge repairs.
No exposure to elements.
No inaccurate pressure readings.

Ask any UNIBOLT man to demonstrate the Gauge Valve and Connector, or write:

**THORNHILL UNIBOLT CRAVER CO.**

P. O. BOX 1184 • HOUSTON, TEXAS

# Introducing the greatest advancements made to date in tractor mounted backhoes

## Sherman Products announces all new digger with increased output to speed digging and reduce costs. Many new features make this Model 54F faster with less maintenance and longer life

HOLES IN THE GROUND—that's what you are really buying when you purchase a backhoe. You aren't interested in a group of parts as such. You are interested in the capacity to dig holes at the lowest possible cost—so that you can sell those holes at a profit.

This means you need a fast, dependable digger with a long service life and low maintenance.

Now, Sherman presents an *all new* power digger that meets these requirements! It has advanced features that make it faster than any comparable backhoe . . . it is so sturdily constructed that it will outlast any comparable backhoe . . . it is so engineered that it requires less maintenance than any comparable backhoe.

Look over the list of Sherman features and you'll see for yourself.

Every single one of these features has been thoroughly tested. In actual digging in all types of soil conditions including hard, frozen clay and sticky gumbo, the Sherman completed 500,000 cycles—the equivalent of two years of normal operation—and was still going strong.

Compare the new Sherman with any tractor mounted backhoe. Make sure that the digger you buy has *all* of the features you need.

**Don't take our word for it. Put the Sherman on any job and *clock it* with a stopwatch. Prove to yourself that the Sherman saves you money by producing more work per dollar invested in time, equipment, maintenance, and manpower.**

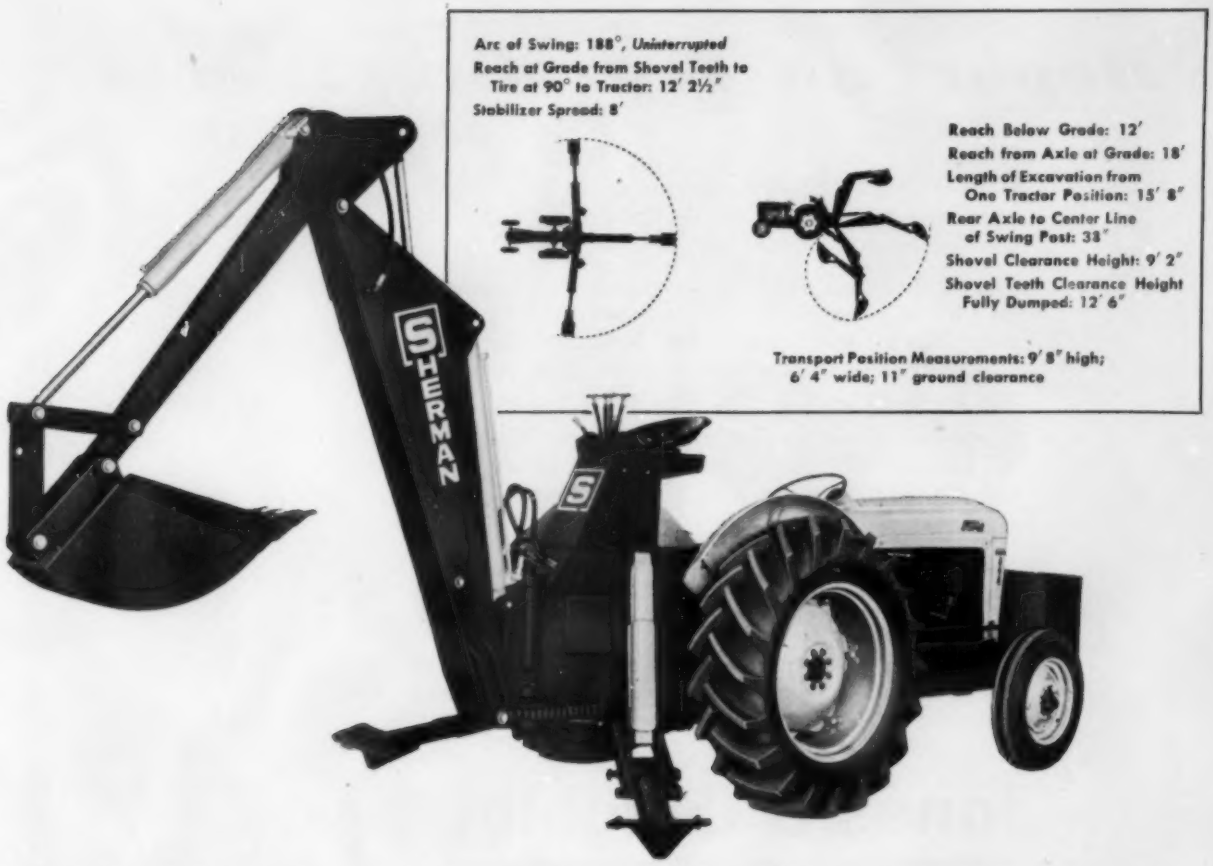
**The all new Sherman breakaway capacity of 9000 lbs. is greater than any comparable backhoe.** This revolutionary Sherman development means more power and faster digging.

**The all new Sherman is fast and powerful** because short hydraulic lines reduce friction power loss. And the exclusive pump drive in combination with the Sherman Planetary Step-up Transmission contributes to greater speed than conventional systems, as does the outstanding pump pressure of 2000 psi.

**The all new Sherman has a wide work radius and a long reach**—an **uninterrupted** arc of swing of 188° together with a 12 ft. reach below grade and a loading height of more than 9 ft.

**The all new Sherman holds steady on sloping or uneven ground** because the hydraulic stabilizers, individually controlled, give both lateral and angular support and the 12″ by 14″ foot plate assures maximum ground contact.

**The all new Sherman can be dismounted in**


Arc of Swing: 188°, Uninterrupted
Reach at Grade from Shovel Teeth to Tire at 90° to Tractor: 12′ 2½″
Stabilizer Spread: 8′
Reach Below Grade: 12′
Reach from Axle at Grade: 18′
Length of Excavation from One Tractor Position: 15′ 8″
Rear Axle to Center Line of Swing Post: 38″
Shovel Clearance Height: 9′ 2″
Shovel Teeth Clearance Height Fully Dumped: 12′ 6″
Transport Position Measurements: 9′ 8″ high; 6′ 4″ wide; 11″ ground clearance
SHERMAN

**a few minutes** by simply removing six pins and four bolts.

**The all new Sherman has an efficient, all purpose shovel** with quick adjustment for straight walls or high loading; full rollback for heaped, non-spilling loads; tapered side cutting edges to prevent binding; replaceable teeth.

**The all new Sherman is comfortable** because the seat is adjustable and the full, anti-skid deck permits leg position changes.

**The all new Sherman lasts longer, costs little for maintenance.** Here are a few of the reasons:

- Main and swing frames are heavy-duty steel plate, weldment construction.
- Full length, box construction sub-frame increases tractor rigidity and acts as a spring-like shock absorber.
- Reinforced, "stress-design" box construction boom with crowd cylinder operating inside for complete protection.
- Heavy roller chain couples the twin, single acting, swing cylinders to post sheave.
- Reinforced, "stress-design", box construction dipstick.
- Hydraulic reservoir is oversized for maximum oil cooling. Its central location and independent suspension eliminate possibility of leaks due to operating stresses.

Yes, the facts prove that the Sherman Power Digger is today's best buy in tractor mounted backhoes.

**Sherman Power Diggers are Engineered Exclusively for Ford Tractors and are Sold and Serviced by your Ford Tractor Dealer**

•

***Write for Bulletin No. 1565***

Sherman
PRODUCTS, INC.
ROYAL OAK, MICHIGAN
POWER DIGGERS • FRONT END LOADERS • FORK LIFTS

# Report on Traveling Blocks

IDECO Shorty Blocks continue to do an A-1 eye-opening job in rotary fields from Canada to the Gulf of Mexico.

The "Fabriform" sheaves are accurately balanced on Double Tapered Timkens for positive alignment regardless of fleet angle or line load. Smooth flame-hardened sheave rims with uniform grain structure add ton-miles to wire line endurance.

These fast (low center of gravity) Shorty Blocks can be unitized with the spring-loaded hook and link supports to add as much as 9 feet of headroom.

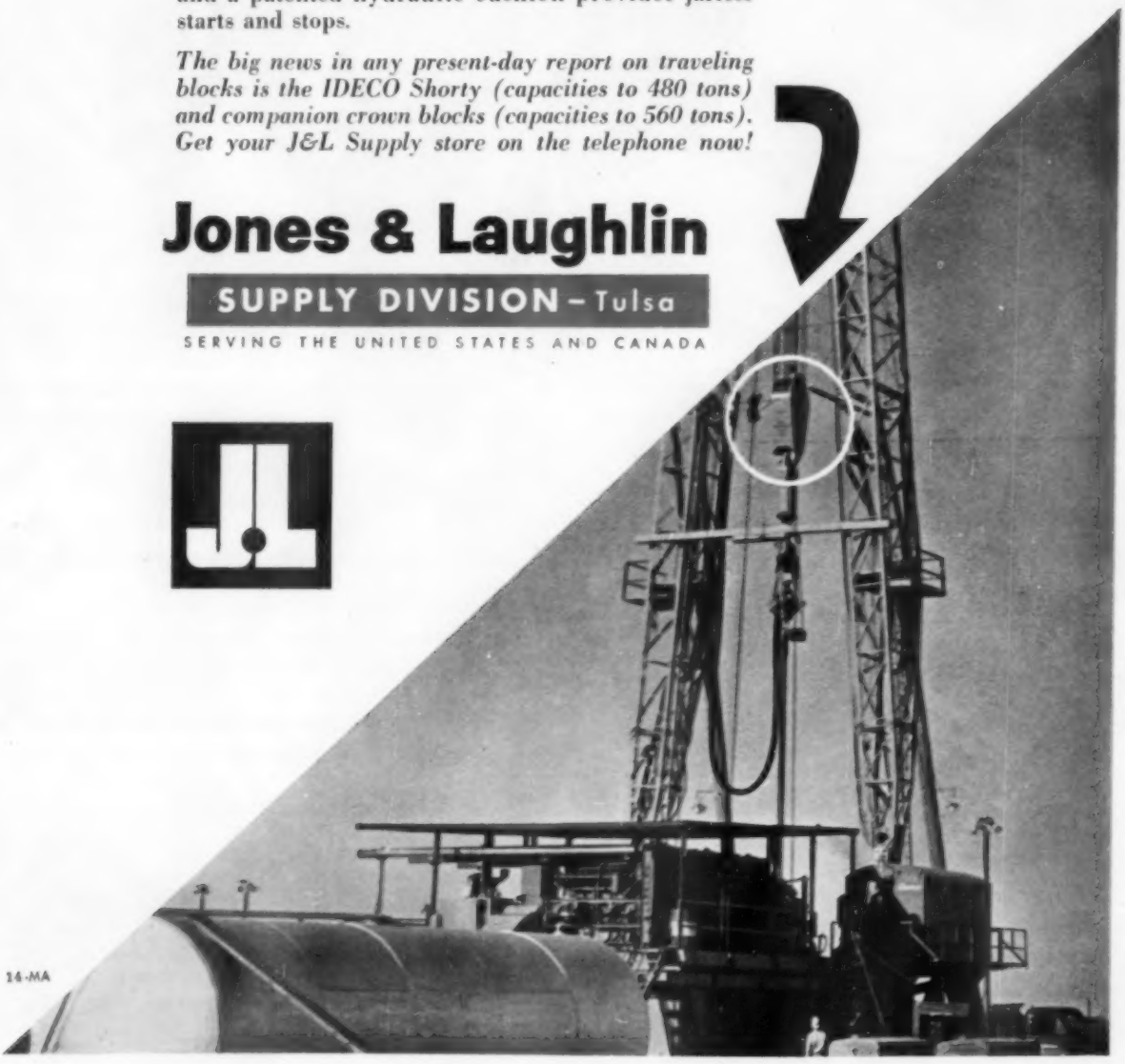
The safety lock is automatic, the hook ingenious, and a patented hydraulic cushion provides jarless starts and stops.

*The big news in any present-day report on traveling blocks is the IDECO Shorty (capacities to 480 tons) and companion crown blocks (capacities to 560 tons). Get your J&L Supply store on the telephone now!*

**Jones & Laughlin**

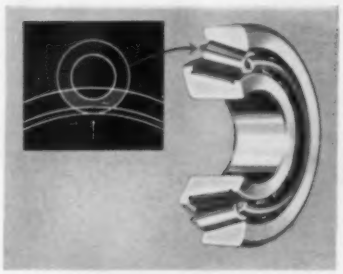
**SUPPLY DIVISION – Tulsa**

SERVING THE UNITED STATES AND CANADA



14-MA

## Built to stand up . . . under 'round-the-clock pressure!



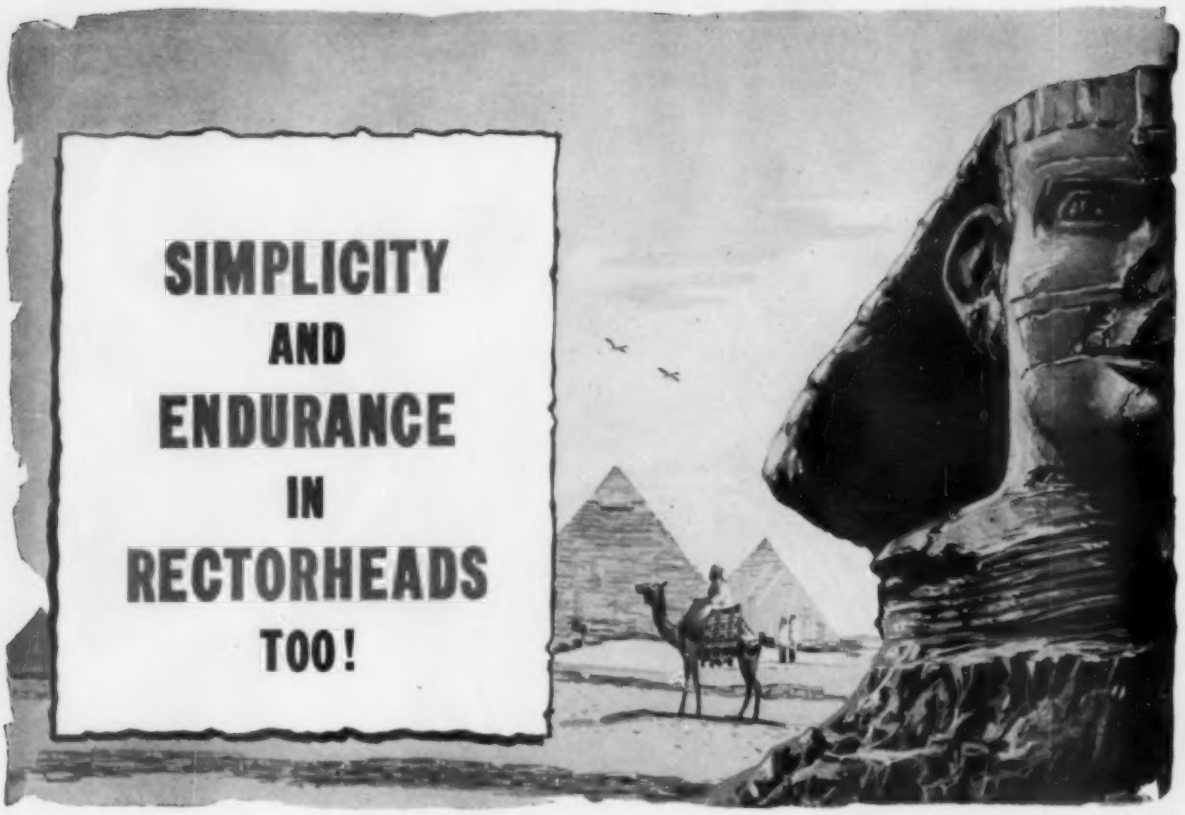
**HIGHER FLANGE IMPROVES ROLLER ALIGNMENT**

*As shown by the gray area above, the higher flange provides a large two-zone contact area for the roller heads. This greatly reduces wear—practically eliminates "end play". Larger oil groove provides positive lubrication.*

The flow of America's vital oil can't be regulated by a time clock! These bobbing pumps work around the clock, around the year—with virtually no attention whatever! Dependable Bower Roller Bearings are more than proving their ability to stand this back-breaking pace—doing it with a minimum of maintenance cost and down-time. That's because important Bower Spher-O-Honed design features, like the one shown at left, have reduced bearing failure to a rarity. Whatever test *you* put them to—tractors, machine tools, jet engines—you'll find that Bower Spher-O-Honed Bearings will last longer and operate more efficiently. Let a Bower engineer show you the many advanced design features and superior quality of the complete Bower line. There are tapered, straight and journal roller bearings for every field of transportation and industry.

BOWER ROLLER BEARING DIVISION
FEDERAL-MOGUL-BOWER BEARINGS, INC. • DETROIT 14, MICHIGAN

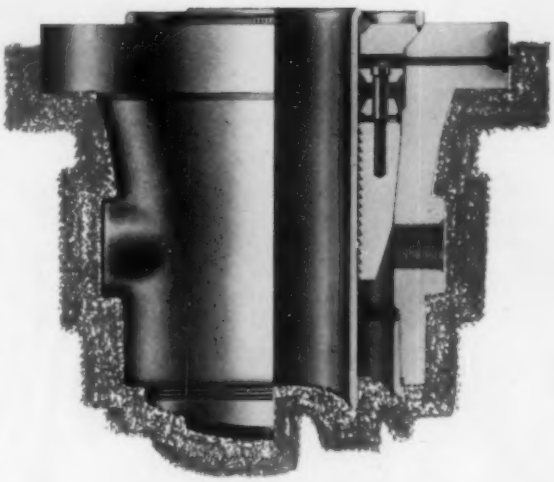
# BOWER ROLLER BEARINGS




The ring-of-steel seal employed in RH Casing Heads is unmatched for simplicity and endurance. In oil fields throughout the world it has survived fires — endured for years without leaking or replacement.

The patented welding ring, welded to the pipe and sealed at the head body with API ring gasket is simplest of all to install. ***The welding ring prevents any well or frac pressure being transmitted to the slips, creating a hydraulic force which would collapse or crush the pipe.***

There is no soft or resilient packing to "flow" under high pressure or temperature; to "freeze" and contract under low temperature; to burn out or deteriorate after years and years of service. Positive proof of this endurance is to be found in more than 100,000 Rectorheads now in service.



**At authorized supply stores everywhere.**

RECTOR WELL EQUIPMENT COMPANY INC

★ MAKING THE OIL INDUSTRY SAFER

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Houston Plant: 2215 Commerce St.

REPRESENTATIVES IN ALL ACTIVE FIELDS

# these *Mines* – these *Mills*

## PRODUCE THE WORLD'S FINEST DRILLING MUDS

Magnet Cove, Arkansas
(barite mine)

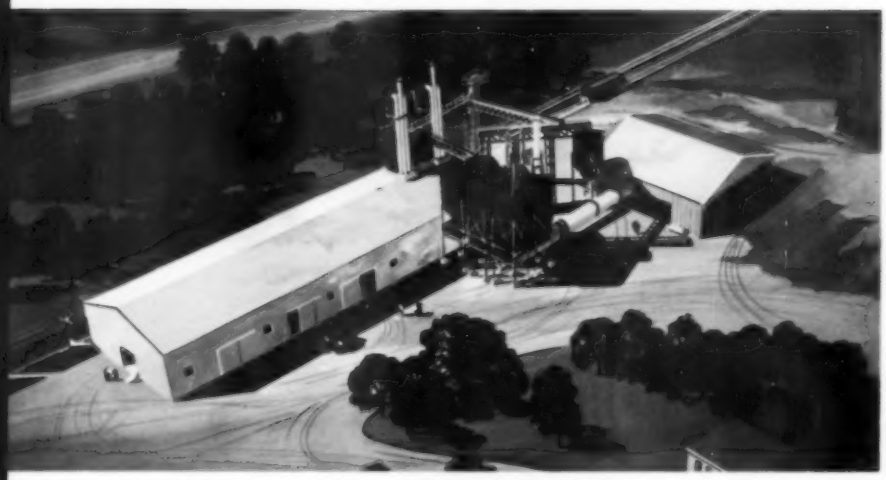
# Magcobar

## THE INDUSTRY'S LARGEST PRODUCING FACILITIES

# Magcobar *brings you an assured supply of drilling mud*

Drilling mud . . . the kind in the Magcobar bag . . . comes from all over the world. And with drilling muds and chemicals playing a bigger role in today's deeper, higher pressure drilling, it is vitally important that the oil industry knows exactly where its supply will come from in the years ahead.

The future supply of high quality drilling muds



Zavalla, Texas
(clay mine and processing plant)

●

Battle Mountain, Nevada
(barite mine and processing plant)

●

Malvern, Arkansas
(barite processing plant)

depends on production capacity and raw material reserves, particularly barite deposits. Magcobar is the world's largest producer of barite.

Magcobar's leadership has been achieved in only one way . . . the investing of millions of dollars for mine and plant construction and a continuing search for and acquisition of raw material reserves.

In addition to the mines and plants shown here, Magcobar has mines in Nova Scotia, Mexico, and Potosi, Missouri.

**This world-wide program assures you of the highest quality materials from Magcobar today . . . and in the future!**

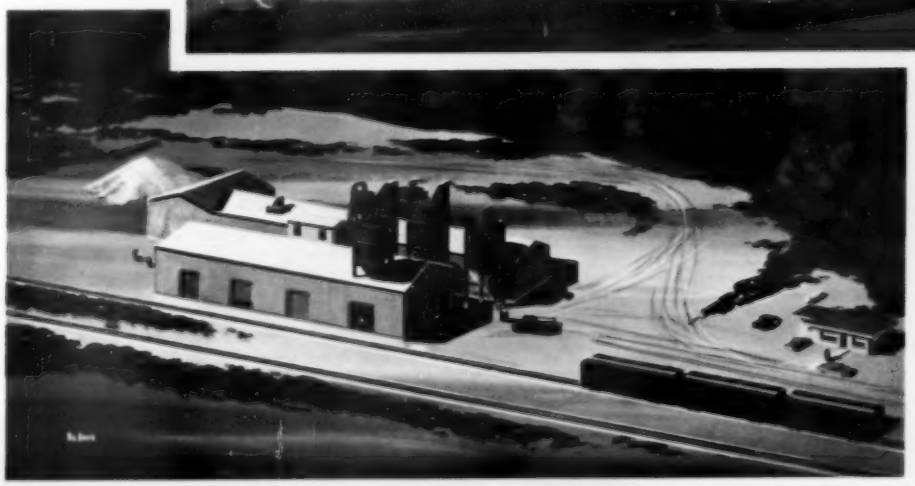
Mykonos, Greece
(barite mine and processing plant)

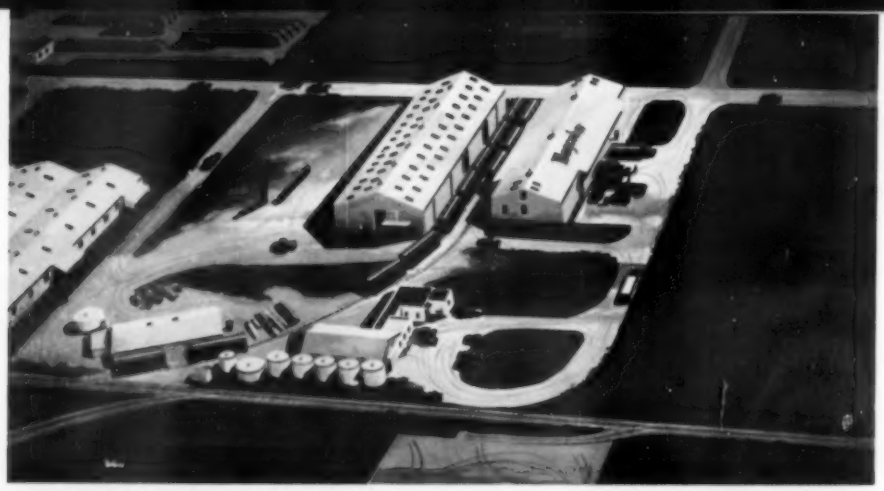
●

Hinson, Florida
(clay mine and processing plant)

●

Brownsville, Texas
(barite processing plant)





Houston, Texas
(processing plant)

●

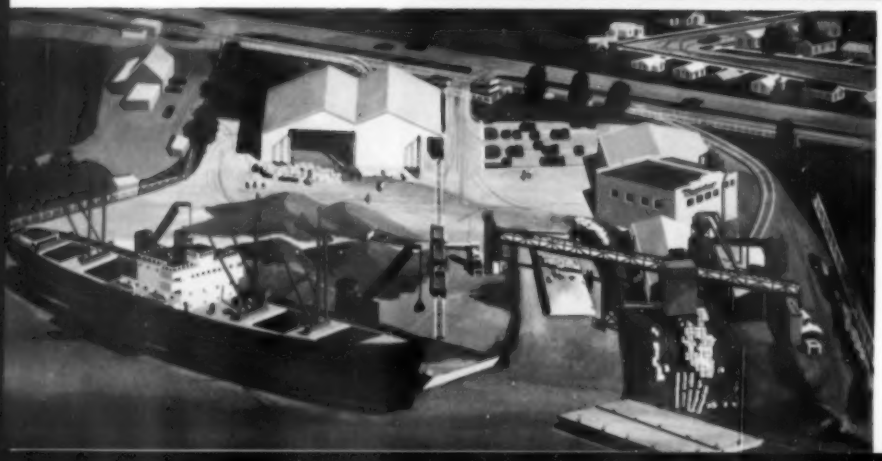
Lake Charles, La.
(barite processing plant)

●

Greybull, Wyoming
(bentonite mine and processing plant)

●

New Orleans, La.
(barite processing plant)



# Magcobar

*Complete*

DRILLING MUD SERVICE

**MAGNET COVE BARIUM CORPORATION**

HOUSTON, TEXAS

Litho in U.S.

# This seal on an air-compressor spells SAFETY from lubricant-caused fires and explosions

If you are operating one, ten or fifty air compressors in your plant, here's big news for you. The day of lubricant-caused compressor fires and explosions is *over!*

Now there's a new chemically tailored compressor lubricant called Pydraul AC that not only lubricates like a premium-grade petroleum oil—*it's fire-resistant!*

You'll realize additional savings in Pydraul AC's ability to minimize carbon deposits on air-compressor exhaust valves and air piping systems.

*No conversion problems*—just drain your flammable lubricant and replace with fire-resistant Pydraul AC—it's that easy.

*Service-proved*—two years of industry-wide service have confirmed Pydraul AC's *safety* and operating economies for power plants, gas transmission, chemical processing and the basic metalworking industry.

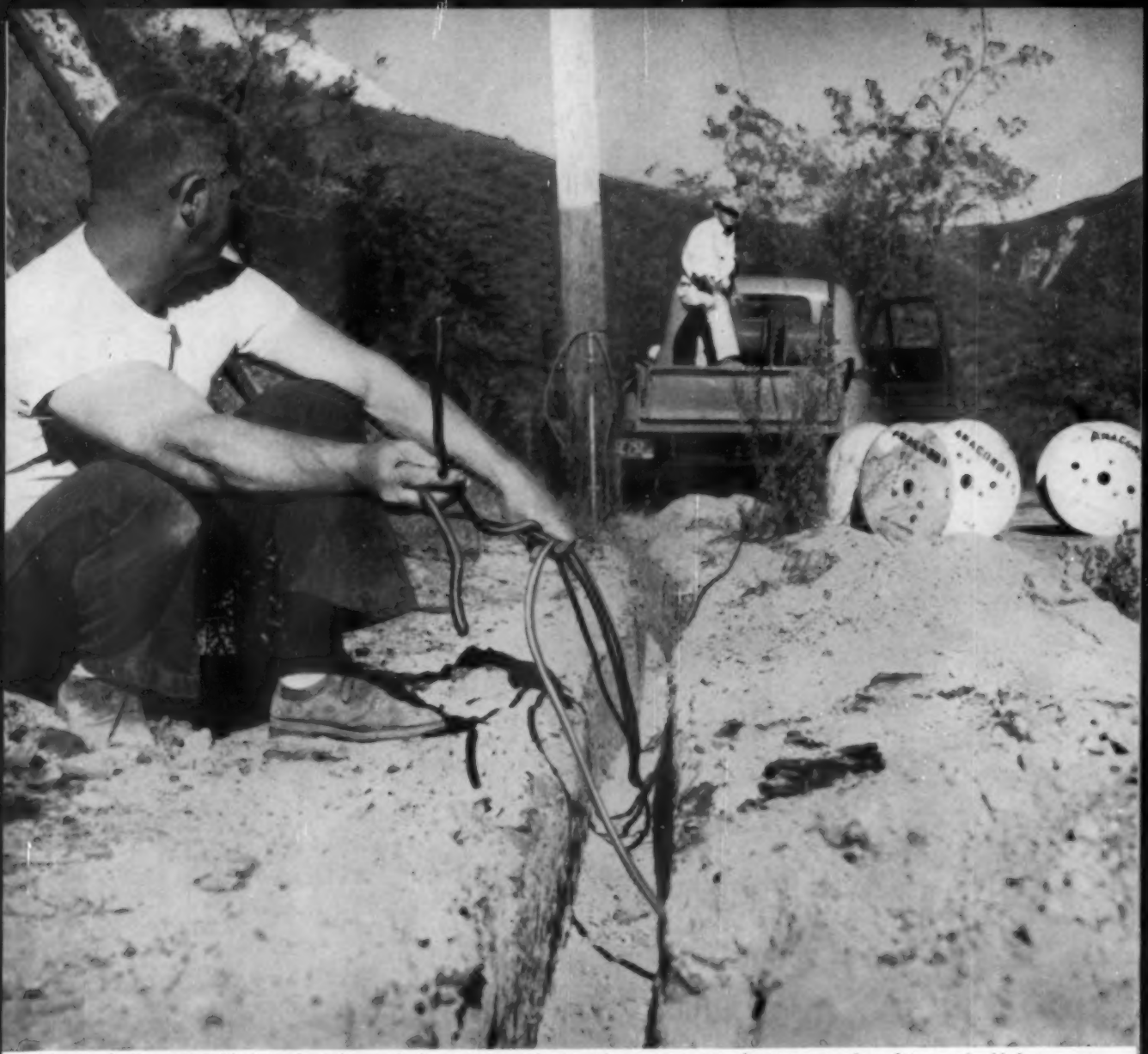
*There's a fire-resistant Pydraul for every industrial hydraulic job:* general-purpose Pydraul F-9; Pydraul 150 and Pydraul 60 for use in precision equipment; and Pydraul 600 for heavy equipment.

*Pydraul: Reg. U. S. Pat. Off.*

*Write today for your copy of Pydraul AC bulletin.*
Organic Chemicals Division
MONSANTO CHEMICAL COMPANY
Dept. PAC-72, 800 N. 12th Blvd., St. Louis 1, Mo.

MONSANTO ®

WHERE CREATIVE CHEMISTRY WORKS WONDERS FOR YOU



**Anaconda Type CP Cable** being buried on cathodic protection job. Special covering resists almost every soil condition you're likely to meet.

# Special cathodic protection cable gives you longer cable life even in "problem soils"

Soils vary. One may be acidic. The next alkaline. One dry. Another wet.

Now Anaconda offers you a special Type CP cable that gives you the very best performance under all these conditions—under *any* condition you're likely to meet.

This cable is *especially* designed for cathodic protection. Its plastic covering resists electro-endosmosis, oil, moisture, and most acids, alkalies and chemicals found in corrosive soil areas. It's rugged, too. Resists abrasion and weathering.

Its greater dependability means fewer repairs . . . lower operating costs.

For full information, call the Man from Anaconda. Or write: Anaconda Wire & Cable Company, 25 Broadway, New York 4, N. Y. 57286

ASK THE MAN FROM **ANACONDA®**
ABOUT **TYPE CP CABLE**

JEFFERSON

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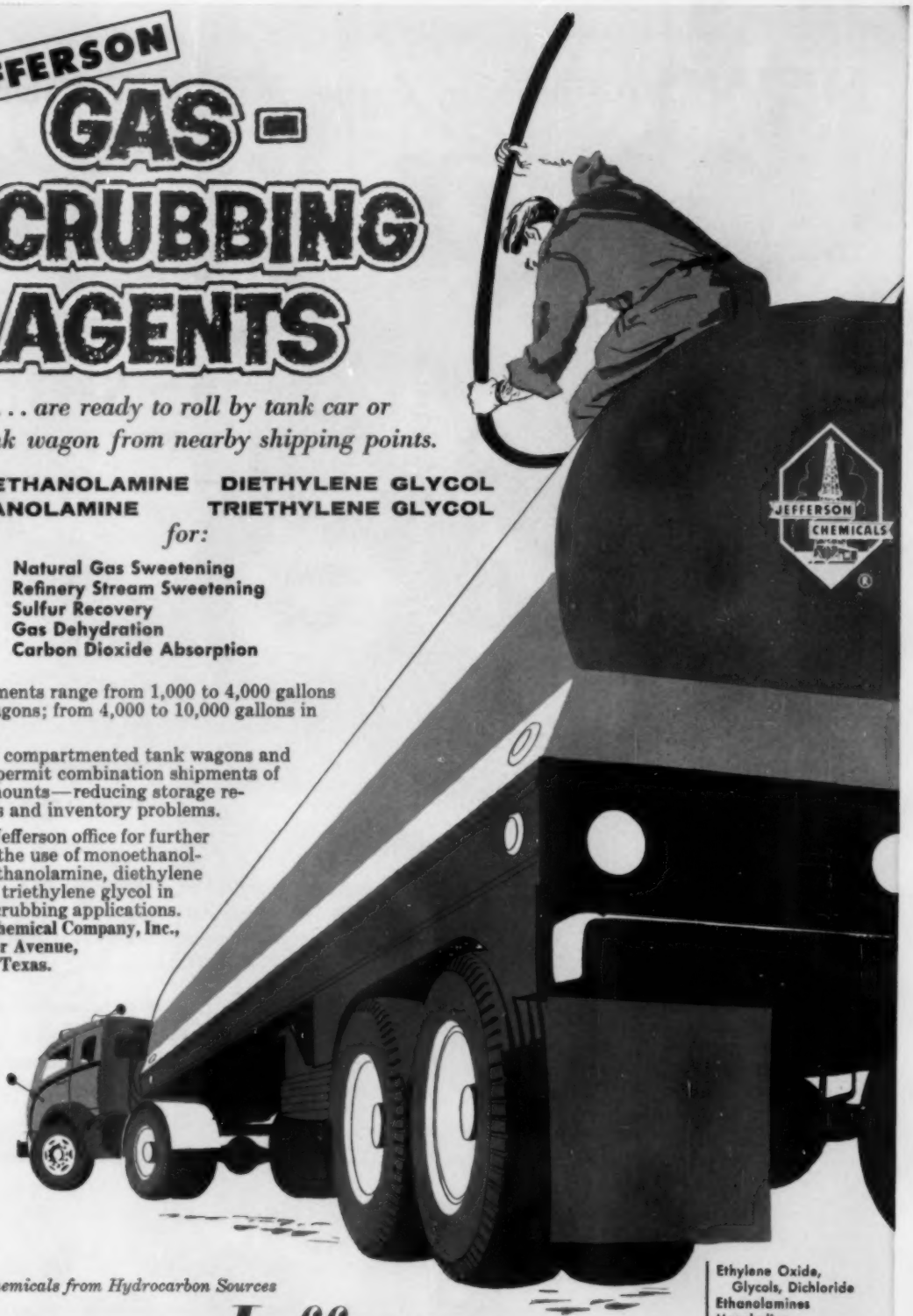
*. . . are ready to roll by tank car or tank wagon from nearby shipping points.*

**MONOETHANOLAMINE** **DIETHYLENE GLYCOL**
**DIETHANOLAMINE** **TRIETHYLENE GLYCOL**

*for:*

**Natural Gas Sweetening**
**Refinery Stream Sweetening**
**Sulfur Recovery**
**Gas Dehydration**
**Carbon Dioxide Absorption**




Bulk shipments range from 1,000 to 4,000 gallons in tank wagons; from 4,000 to 10,000 gallons in tank cars.

Jefferson's compartmented tank wagons and tank cars permit combination shipments of smaller amounts—reducing storage requirements and inventory problems.

Call your Jefferson office for further details on the use of monoethanolamine, diethanolamine, diethylene glycol and triethylene glycol in your gas-scrubbing applications.
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**1121 Walker Avenue,**
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**Jefferson**
**CHEMICAL COMPANY, INC.**

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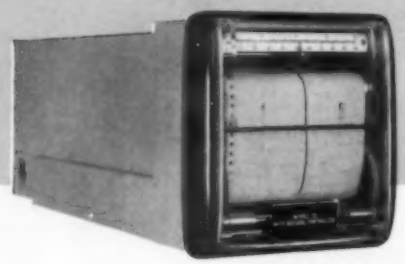
**Ethylene Oxide, Glycols, Dichloride**
**Ethanolamines**
**Morpholine**
**Piperazine**
**Polyethylene Glycols**
**Nonyl Phenol**
**Surfonic® Surface-Active Agents—N Series and TD Series**
**Ethylene Carbonate and Propylene Carbonate**

# NEW! pneumatic transmitting tachometer with DIRECT LINEAR SIGNAL

## the Foxboro Type 16A Pneumatic Speed Transmitter

- mounts in any position
- accurate to ±½% across entire range
- adjustable span and zero
- Dust-tight gasketed case continuously purged
- Low cost compared with other recording tachometers
- Operates on simple force-balance mechanical principle.

*Direct-connects to remote pneumatic recorder or controller, such as Consotrol panel recorder shown below.*



At last — a tachometer with 3-15 psi air signal *directly proportional* to rpm! Speed changes are recorded on a uniform-scale chart. Accurate measurements of rpm are easy to read throughout the entire range. No crowded bottom scale!

The Type 16A Speed Transmitter is available for ranges from 0-320 rpm to 0-5300 rpm. Full-scale accuracy of ±½% is consistently maintained. Small and light weight, it can be mounted *in any position* — never needs lubrication.

For rotating equipment having wide speed variations, the Type 16A is ideal. It can easily be incorporated into any present pneumatic control system. Write for full details.
**The Foxboro Company, 606 Neponset Avenue, Foxboro, Massachusetts, U.S.A.**

FOXBORO
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**PNEUMATIC SPEED TRANSMITTERS**

There's MORE

## from Allis-Chalmers...

# Dependable Power

## for the Petroleum Industry

MORE continuous processing results from the many features of Allis-Chalmers deep-rib, chemical-type motors in a variety of refinery and pipeline uses.

*Here are only a few of the reasons why these motors "pay off" in petroleum applications:*

**MORE cooling surface,** more iron and copper content—all contribute to longer Allis-Chalmers motor life in dirty, hot or corrosive locations.

**MORE drainage provisions** result from condensation-eliminating sump and drain system in motor yoke. Moisture can't collect to short out this motor.

**MORE corrosion-resistance** is designed into hardware. All bolts are hexhead type and Parkerized to fight off rust.

## Rib-Type MOTORS 1 to 100 hp

Rib construction is available in Allis-Chalmers motors from 1 to 100 hp. As a new machinery component or as replacement, specify Allis-Chalmers. Contact your A-C district office or distributor, or write Allis-Chalmers, General Products Division, Milwaukee 1, Wis.

# ALLIS-CHALMERS

A-5290

ACCO
for Better
Values

# R-P&C VALVES

DESIGNED FOR DEPENDABILITY

## BAR STOCK VALVES FOR CLOSE CONTROL, ESPECIALLY SUITED FOR CLOSE-COUPLED INSTALLATIONS

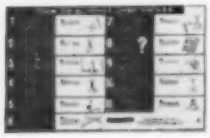
*• rated for pressures up to 10,000 PSI •*

• The bar stock valve, designed originally by R-P&C engineers, is really a versatile performer. First developed for instrument use, bar stock valves have proven to be the answer to valve problems of many different kinds. Designed for close control, they are ideal for throttling service. Their compactness makes them the natural choice for crowded locations such as panel boards. Economically priced, they serve in many applications as general purpose valves. And they are built in a wide variety of materials—can withstand extremely high temperatures and pressures.

For example, the **Fig. 1040-A Valve** shown here, made from carbon steel, is rated for 10,000 psi at 150°F. Each of these valves is individually tested at 15,000 psi before it leaves the factory.

R-P&C's complete line of bar stock valves includes constructions in 12-14 chromium stainless steel, 18-8 molybdenum stainless steel and bronze. Sizes range from ⅛" to 1" in globe and angle styles with female ends, male and female ends, or male union ends. For extremely severe throttling services, R-P&C bar stocks can be supplied with stellite discs for extra abrasion resistance.

Your R-P&C distributor carries not only a complete line of bar stock valves but also a wide selection of gate, globe, angle and check valves in bronze, iron, and cast and forged steel. You will find the answer to your valve problem in his selection.



**FREE WALL CHART**
*"How to Protect Your Valves"*
Installation pointers, operating tips, clues to longer valve life. They are all on this 22" x 17" wall chart. Write for your free copy.

**R-P & C VALVE DIVISION**
**AMERICAN CHAIN & CABLE**

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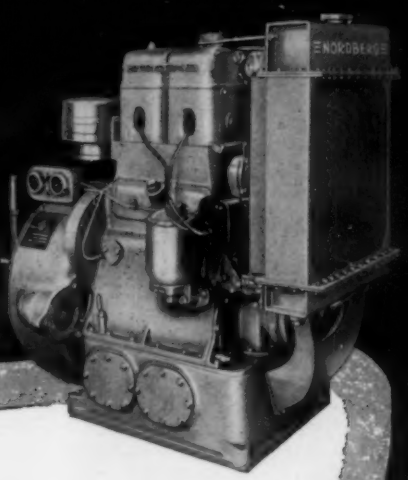
ACCO

# Complete Oil Field Sales and Service for

# NORDBERG

## POWER CHIEF®

## OIL FIELD ENGINES



## . . . available from

## FRED E. Cooper, Inc.

In keeping with plans to greatly increase the scope of service throughout the oil fields, Nordberg is pleased to announce the appointment of *Fred E. Cooper, Inc.* for the sales and service of Nordberg *Power Chief* Diesel and Gas Engines throughout all oil producing areas.

Backed by the well-known Cooper field service organization, and with parts stocks strategically located, Nordberg *Power Chief* Oil Field Engines will now, more than ever, be your best buy for production pumping and other oil field power jobs.

These heavy duty, medium speed engines are presently offered in 1 and 2-cylinder gas burning units up to 36 hp max., and in 1, 2 and 3-cylinder Diesel units from 10 to 45 hp.

For further details, contact your nearest Fred E. Cooper office, or write: *Nordberg Mfg. Co., Milwaukee, Wisconsin.*

**FRED E. COOPER, INC.**
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**Telephone CHerry 2-2194**

**Branches:** Houston, Odessa, Olney

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DIESEL • DUAFUEL® AND SPARK-IGNITION GAS ENGINES

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*Builders of America's Largest Line of Heavy Duty Engines*

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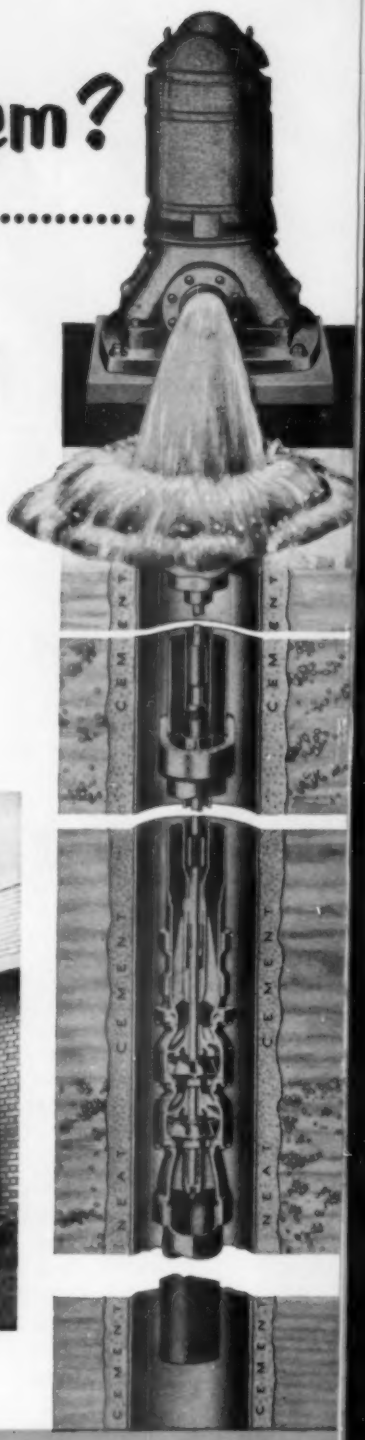
# Water Supply a Problem?

## Large or Small.... You can Count on Layne!

To Layne Engineers there are no small jobs. Some are just larger than others. Whether your industrial business needs 30 gallons per minute, or 30,000 gallons per minute, the delivery and quality of your water needs, when you need it, is what counts . . . and you can count on Layne!

Each installation requires the same research, the same calculations, the same truthful recommendations. Layne provides the same careful attention to every industrial water problem. Layne is concerned with just one thing . . . . the unfailing and economical delivery of water in the required quantities and desired quality . . . and you can count on Layne!

Write for our General Services Bulletin Number 100.



*Firestone Rubber Company of Akron, Ohio, or Baxter Company of Cleveland, Miss., both industries require and receive the same attention regardless of their water needs. When you need water . . . you can count on Layne!*

1882 — 1957
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75 YEARS OF PROGRESS

WATER WELLS • VERTICAL TURBINE PUMPS • WATER TREATMENT

**LAYNE & BOWLER, INC. MEMPHIS**

General Offices and Factory • Memphis 8, Tennessee

LAYNE ASSOCIATE COMPANIES THROUGHOUT THE WORLD

# INGALLS built an "island" to advance the search for oil!

Riding high in the Gulf . . . on its way to a new offshore oil field . . . goes the Kermac 46, largest submersible oil drilling platform ever to go to sea. It was built by INGALLS for Kerr-McGee Oil Industries, Inc. to carry the search for oil into new, hitherto undeveloped offshore areas.

The Kermac 46 is stabilized by a maze of pressure tubes. It is capable of riding out hurricanes . . . of sinking six wells without relocating, in water up to 70 feet deep.

Aboard, there are air-conditioned accommodations for a crew of 50, helicopter landing strip, Texas deck, and a derrick mast towering 156 feet above the derrick floor.

If *your job* calls for imagination and economy, experience and technical skills . . . consult a specialist — INGALLS!

## THE INGALLS SHIPBUILDING CORPORATION

*Executive Offices:* Birmingham, Alabama
*Branch Offices:* New York, Washington, Philadelphia, New Orleans, Chicago, Atlanta, Houston
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Additional marine repair facilities at the Arnold V. Walker Shipyard, Inc., a subsidiary of Ingalls Shipbuilding Corporation, located at Pascagoula, Miss. Box No. 628. Telephone No. South 2-3511.

**ENGINEERS:** For jobs with a future, contact Ingalls today.

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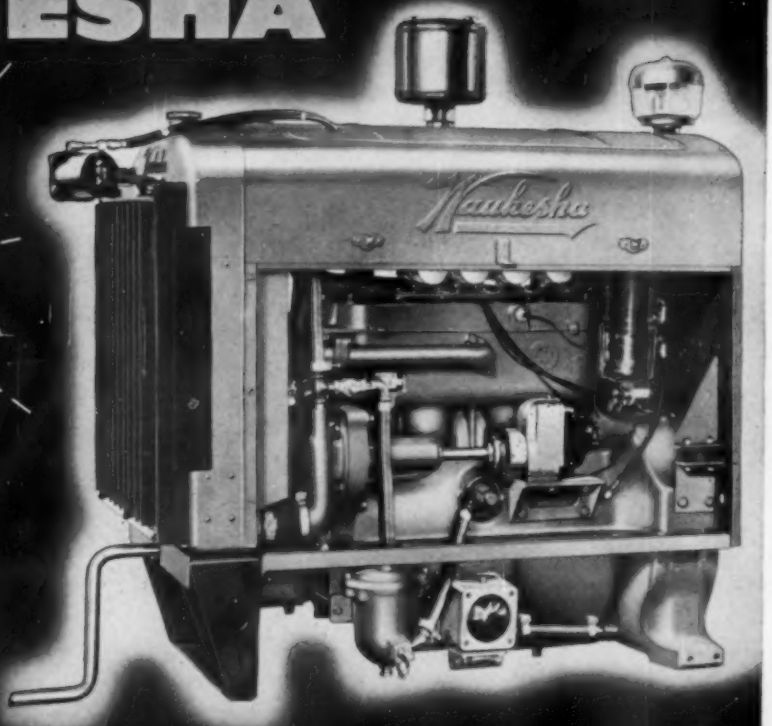
of Offshore Service Vessels, Drilling and Commercial Barges, Tankers, Naval and Merchant Vessels.

INGALLS SHIPS SERVE THE WORLD

# WAUKESHA

# LONG LIFE

## OIL FIELD POWER UNITS




Typical Long-Life Utility Unit—Model XAHU

## Continuous Duty Power—for long periods *without servicing*

The *Long-Life* oil field Waukeshas are special gas power units—with additional features and accessories built right in. That's why they operate without any of the usual routine maintenance and attention. Now, the inspections needed are few and far between.

Just give these *Long-Life* units a regular and uninterrupted fuel supply, and you'll make considerable savings—in pumping and compressor service for oil and gas pipe line feeder operation, and similar uses.

Basically these *Long-Life* power units have the standard gas engines—long famous for being rugged and reliable—that have made Waukesha the world's finest oil field power.

On these basic engines Waukesha assembles the many *Long-Life* design-specials including specially lubricated clutches; automatic oil levelizers; low tension magnetos, with individual coil, low wear spark plugs; special fan belts, and water stabilizing filters; water condensers, and automatic radiator shutters. You'll want details on all *Long-Life* features.

*Send for descriptive bulletin 1702.*

| LONG-LIFE CONTINUOUS DUTY NATURAL GAS UNITS | | | | | RECOMMENDED 65% HP RATINGS | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Model | Features* | Bore & Stroke | Displ. | Speed (rpm) → | 800 | 1000 | 1200 | 1400 | 1500 |
| FCU | 4-Ir | 3¼ x 4 | 133 | | 7 | 9 | 11 | 13 | 14 |
| XAHU | 4-Ir | 3⅜ x 4½ | 186 | | 10 | 14 | 17 | 20 | 21 |
| 190-GLBU | 6-A | 3¾ x 4 | 265 | CONTINUOUS DUTY ratings shown are 65% of maximum hp available at indicated speeds → | 19 | 23 | 27 | 31 | 32 |
| 195-GKU | 6-A | 4¼ x 4 | 320 | | 20 | 25 | 31 | 36 | 38 |
| 135-GKU | 6-A | 4¼ x 5 | 426 | | 28 | 34 | 41 | 47 | 50 |
| 140-GZU | 6-A | 4⅝ x 5½ | 554 | | 42 | 52 | 62 | 71 | ..... |
| 145-GZU | 6-A | 5⅜ x 6 | 817 | | 62 | 77 | 90 | 103 | ..... |
| WAKU | 6-A | 6¼ x 6½ | 1197 | | 84 | 114 | 124 | ..... | ..... |

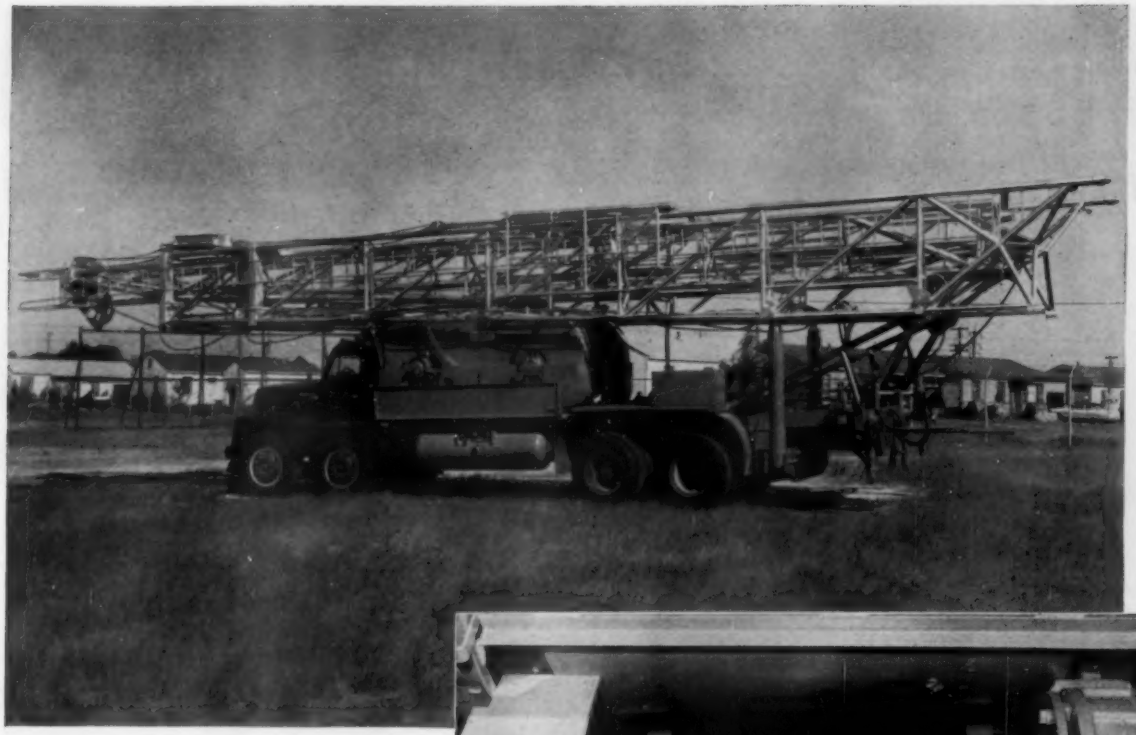
*Features: 4, 6—No. Cylinders; A—Aluminum Pistons; Ir—Cast Iron Pistons

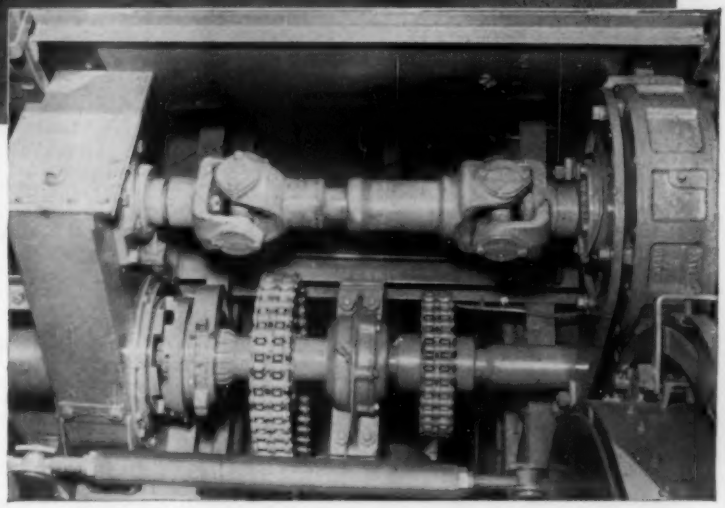
**WAUKESHA MOTOR COMPANY**

**WAUKESHA, WISCONSIN**

**New York • Tulsa • Los Angeles**

350





Driving the draw-works—
Rex Roller Chain.

REX®

# Roller chain on the Franks Rocket Rig

Have a look inside this Franks Rocket Rig (Franks Division, Cabot Shops, Inc., Drawer 3216, Whittier Station, Tulsa). You'll see Rex Roller Chain driving its draw-works.

Why Rex? Rex pitch control assures equal load distribution over all parts—and greatly extended chain life. Rex manufacturing has added tremendous strength at the pin holes. Rex glide-fit design makes assembly and disassembly fast and easy.

Why Rex? It's the very best of all the good roller chains—best design, best materials, best manufacture to the precision tolerances needed to keep your rig running around the clock.

CHAIN Belt Company, 4619 West Greenfield Avenue, Milwaukee 1, Wisconsin.

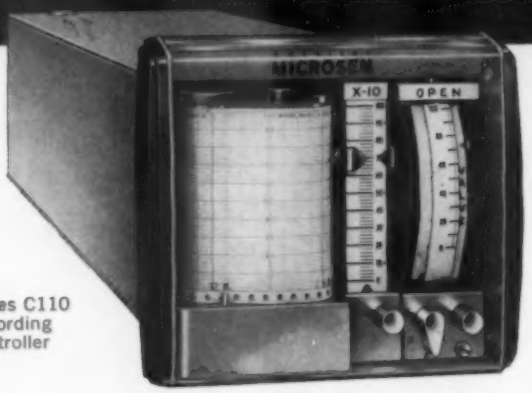
**CHAIN BELT COMPANY**

Milwaukee 1, Wisconsin

**Oil Field Offices:** Dallas • Houston • Los Angeles • New York

**Export Offices:** Milwaukee • New York

# NEW TRANSISTORIZED ELECTRONIC CONTROLLERS
## Interchangeable for complete versatility




Series C110
Recording
Controller

Series C120
Circular Scale
Indicating
Controller

The new 'American-Microsen' Series C100 Electronic Controllers can be interchanged at the panelboard in seconds. A recording controller to an indicating type . . . a proportional-action controller to proportional-plus-reset . . . slow reset to fast reset – any of these replacements is quickly made by pulling one unit out and plugging in the other.

The controller settings of the 'American-Microsen' System are all calibrated and repeatable. When a controller station is replaced, the proportional, reset and rate settings can be made in advance so the process is on control the instant the changeover is completed. No playing around to tune in the control.

When the process is on manual control during a replacement operation, the controller station stays in balance with the actual valve position. Thus the process can be changed back to automatic control without "bumping" or upset. A unique feature of the 'American-Microsen' System eliminates any "balance" or "seal" position between manual and automatic.

These are but a few of the many functional advantages of the new 'American-Microsen' Electronic Control System. Join the many satisfied users of this new approach to process control. Make certain you have the better control and simplified servicing so essential to higher product quality and greater operating economy. Arrange for a meeting with one of our sales engineers to determine the best equipment for your service. *Write for Bulletin RC100.*

### Controller Performs These Functions

Measures input signal from transmitter and records or indicates in terms of the measured variable — pressure, temperature, flow, etc. (The Series C110 records on a 3-inch wide strip chart, the Series C120 indicates on a 4-inch diameter scale.)

Provides means of setting the desired value of the measured variable (set point) and compares actual value with desired value.

Transmits control signal, incorporating proportional, reset, and/or rate actions to operate final control element.

Provides means to operate control element manually with simple switch and manual knob.

### Ultra-Modern Features Provided

All functions of recording (or indication), controlling (proportional, reset, and/or rate), and manual valve operation *in a single housing.*

Transistorized controller station for ultimate reliability and long service life.

Printed circuitry and miniaturized components for space-saving simplicity.

Plug-in units for complete interchangeability and ease of maintenance.

Ratio, cascade, and other similar control arrangements, using standard instruments.

Direct bumpless transfer from manual to automatic control with no intermediate position.

DC signals of 1.0 to 5.0 milliamperes for instantaneous distance transmission up to 30 miles.

Controllers are compatible with any unit of other manufacture using the standard 1 to 5 milliampere DC signal.

# MANNING, MAXWELL & MOORE, INC.

MAXWELL MANNING MOORE INC. TRADE MARK

**INDUSTRIAL CONTROLS DIVISION • STRATFORD, CONNECTICUT**

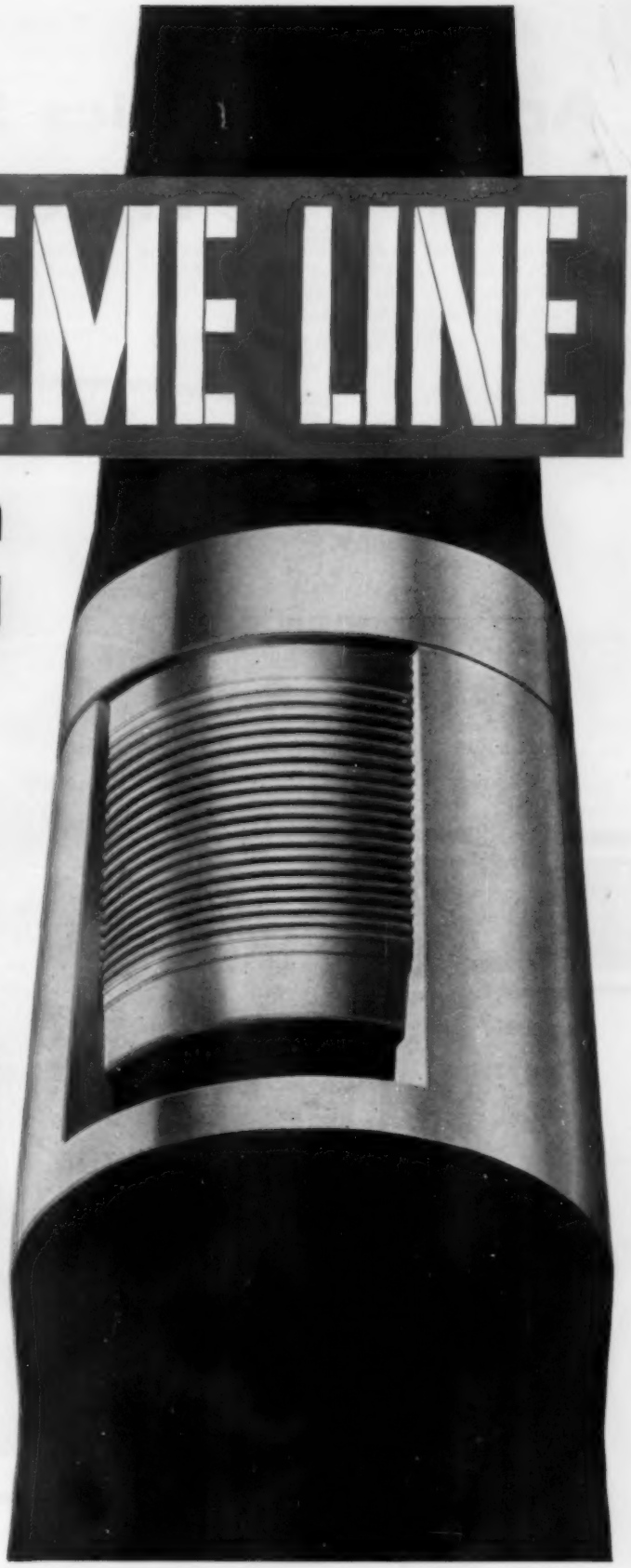
MAKERS OF 'AMERICAN-MICROSEN' ELECTRONIC INSTRUMENTS FOR MEASUREMENT, TRANSMISSION AND CONTROL

# J&L EXTREME LINE CASING

## for deep wells

- High strength joint
- 100% leak resistant

J&L Extreme Line casing meets the challenge of your toughest deep well problems. Investigate the unusual advantages of this new J&L casing available in grades J-55, N-80 and P-110. Write for complete details to the Jones & Laughlin Steel Corporation, Dept. 416, 3 Gateway Center, Pittsburgh 30, Pennsylvania.

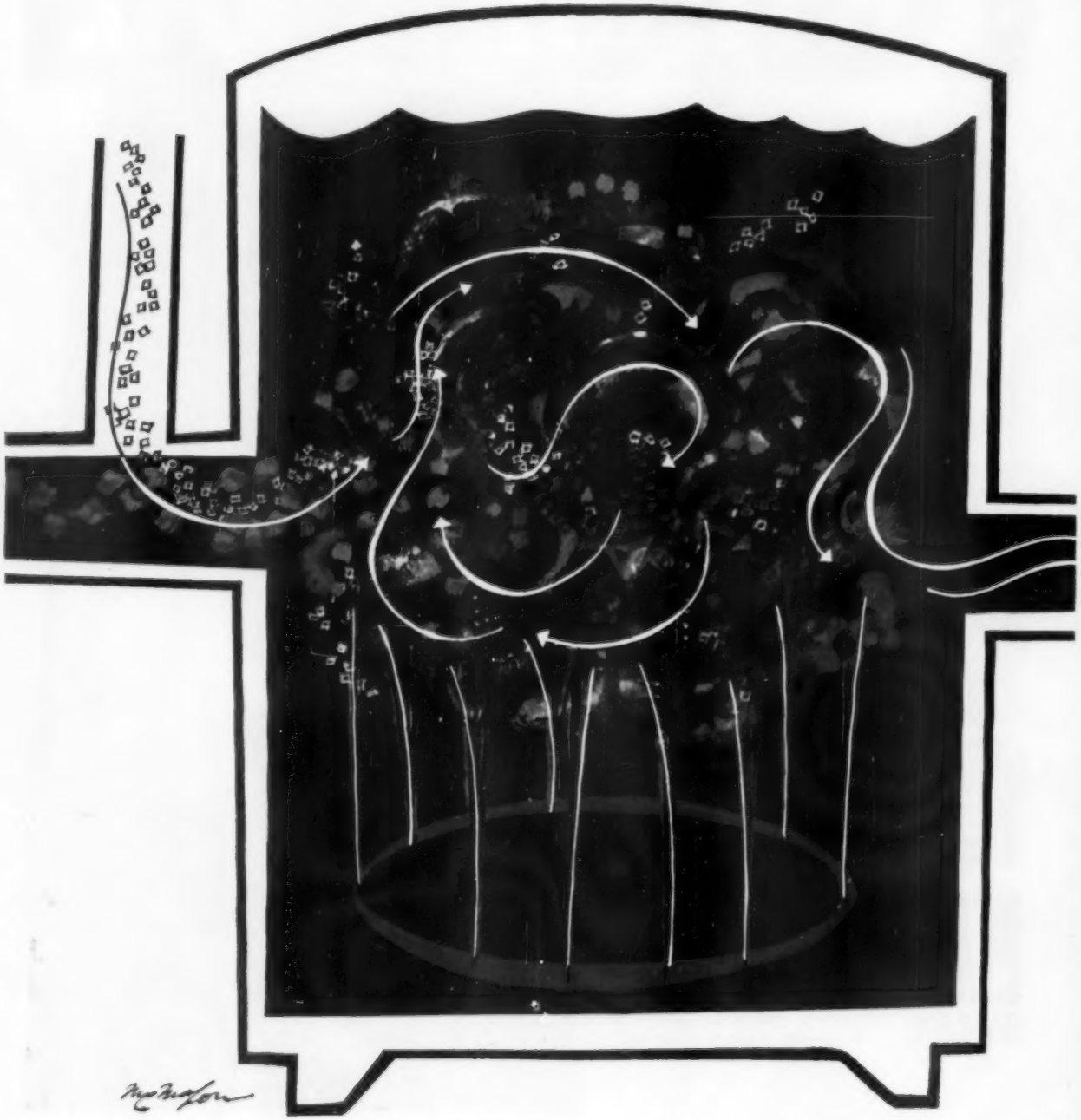


**High joint strength.** A modified Acme-type (rectangular thread form) thread with a steep flank angle assures a strong interlock, takes tensional loads in shear.

**100% leak resistant.** Separate sealing surfaces lock together when two lengths of casing are joined. Seal consists of a curved surface extending beyond the male threads and a tapered conical seat beyond the inside end of the mating female threads. The number of threaded connections is halved.

J&L STEEL **Jones & Laughlin** ...a great name in steel

# Armour Organics Stop Sludge in Refinery Products



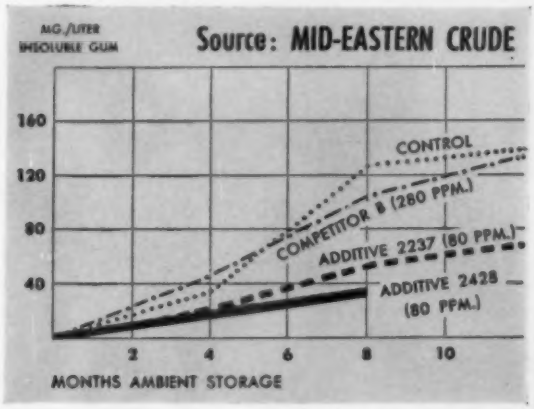
Here is a unique group of polar organic surface active chemicals that meet the toughest industry requirements for fuel additives. They can be important to you because:

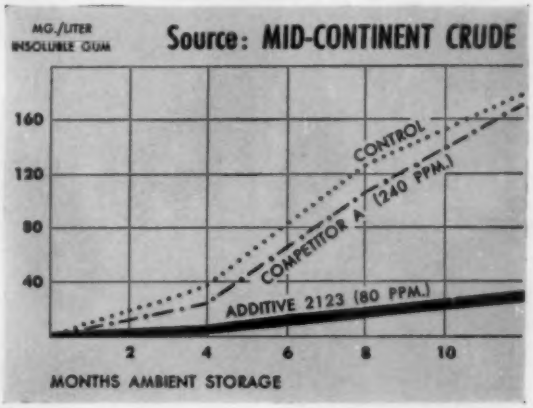
(1) Insoluble gums can now be effectively solubilized or inhibited for as low as *1¢ per barrel.*

(2) Filterability and color stability can be controlled to meet the strictest "specs." Unstable furnace oils, which previously caused filter plugging in burner operations and exhibited color degradation, are no longer a problem when Armour additives are used.

## ARMOUR PRODUCTS EXCEL IN 12 MONTHS STORAGE TESTS

Four fuel oil stocks (West Texas, Mid-Continent, Venezuelan and Middle East types), have been subjected to 12 months ambient storage conditions using 41 potential additives. These 41 additives resulted from the screening of over 300 chemicals. Four Armour products (2 graphically shown below) were outstanding in their ability to inhibit and/or solubilize against radical color change. In addition, most effective for West Texas crudes was Armour Additive #2598; for Venezuelan crudes, Additive #2237.



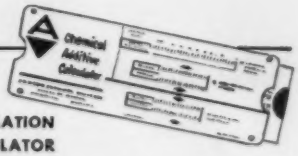




## OTHER REFINERY APPLICATIONS

Even the most rigid specifications for stabilization and corrosion inhibition of gasoline, diesel and jet fuels can be met by adding Armour chemical additives.

Armour polar organic surface active agents have the innate ability to adsorb onto metal surfaces, rendering such surfaces hydrophobic. When used in lubricating oils and greases, this property, plus superior lubricity and corrosion protection, assures longer machine life. In addition, this adsorption characteristic also helps inhibit corrosion and fouling in operational equipment.

The Armour Chemical Division is ready to help you utilize the proper additive for your special situation. Let our trained staff assist you by recommending the Armeen® or Duomeen®, or one of their derivatives, specifically designed to solve your problem.




**SEND FOR SAMPLES, INFORMATION AND FREE SLIDE RULE CALCULATOR**

☐ Chemical additive "Slide Rule" Calculator.

Samples of _____
(Fill in chemical desired)

Applications information on _____

_____

NAME _____ TITLE _____

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CITY _____ ZONE _____ STATE _____

G5

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*Leader In Progressive Fatty Acid Chemistry*

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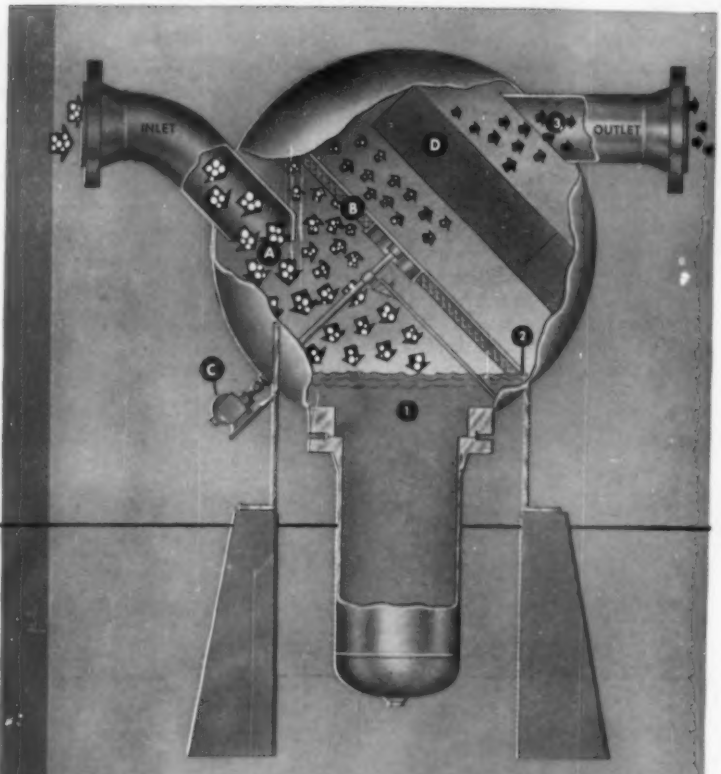
# MORE EFFICIENT RESULTS!

# PEERLESS SCRUBOSPHERE*

*Spherical scrubber for dust and liquid removal from gas flow

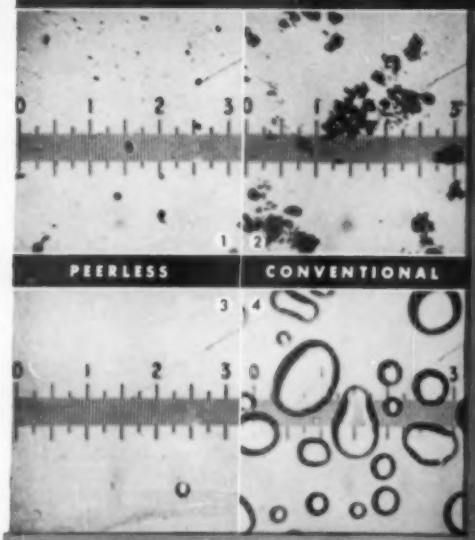



(A) The majority of incoming liquid and solid particles are directed down into reservoir. 1

(B) Lighter solid particles carried by gas stream are separated on surfaces of contactor which are kept wet and clean by revolving through liquid reservoir. 2

(C) Contactor is revolved by explosion-proof gear motor.

(D) Mist Extractor removes any remaining liquid particles from gas stream prior to outlet. 3




These photographs were made of microscope slides introduced downstream of the Scrubosphere and a conventional vertical oil bath cleaner under the same operating conditions. Plates 1 and 2 show the comparative amounts of iron oxide not removed with the amounts introduced being identical. Plates 3 and 4 indicate comparative oil loss with vapor rate through the vessels being the same.

**LOOK AT THIS TEST** The test at the left indicates the superiority of Peerless Scrubosphere over conventional oil bath dust scrubbers. The SCRUBOSPHERE operates with no loss of efficiency at low flows, minimum liquid loss, and very low pressure drop. Other outstanding features include easy vessel access with removable self-cleaning contactor, a sump for slugs of solid or liquid particles, and minimum cost.

*For detailed information write for Bulletin No. 180*

**PEERLESS MANUFACTURING CO.**

P.O. Box 13165 Dallas, Texas

*Representatives in All Principal Cities*

PEERLESS MFG. CO. DALLAS TEXAS

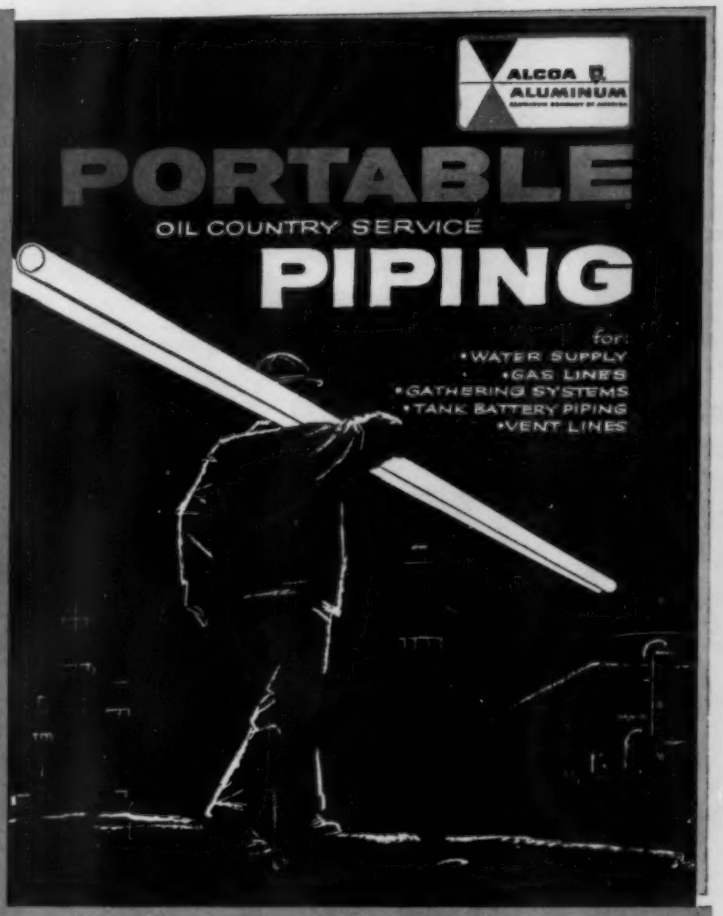
# Cut costs of oil country piping with Alcoa Aluminum pipe

## This FREE BOOKLET tells you how

Look to Alcoa® Aluminum portable piping for low-cost, dependable oil country service. A new free booklet tells you why portable piping of Alcoa Aluminum is best for temporary oil, gas, water and air lines.

Find out how Alcoa Aluminum Piping cuts labor and handling costs because of its light weight and easy portability. A single workman can easily handle standard pipe lengths; and smaller crews can handle larger quantities quickly. The long service life of Alcoa Aluminum portable piping means extra cost savings, too. Get complete data on sizes, performance, ready availability and sources of supply of pipe and quick couplers available for aluminum lines.

Use the handy coupon to get this free booklet now! It contains a sound, low-cost solution to portable piping problems in oil country service.

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ALTERNATE SUNDAY EVENINGS

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☐ Please send me your new literature describing portable piping of Alcoa Aluminum for oil country service.

I need low-cost, portable piping for the following oil country services:

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Name_____ Title_____

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The WORLD'S BEST Clutch on the WORLD'S MOST SENSATIONAL drilling rigs . . . that's WILSON! Wilson revolutionized drilling because they were the FIRST to use ONLY ONE TYPE OF CLUTCH ON ALL DRIVES . . . the WILSON AIR-TUBE DISC Clutch. This clutch is longer lasting . . . the most powerful and foolproof . . . and offers absolutely the fastest and smoothest engagement and disengagement of any air clutch. WILSON AIR-TUBE CLUTCHES are used on each Wilson rig! Count the air clutches on *your* rig, then compare . . . It can *ONLY* be a modern rig if it's a WILSON!

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MANUFACTURING CO., INC.

WICHITA FALLS, TEXAS, U.S.A.

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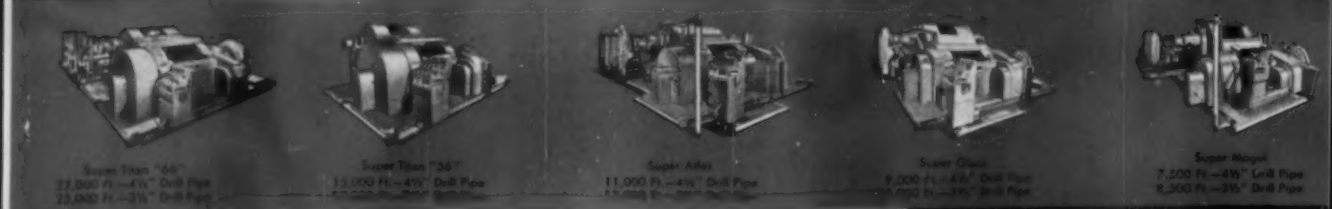

The Most Modern and Complete Line of Rigs in the World!

**BE MODERN — BUY WILSON**

# *Truly--* more for your money!

- √ *Higher Venting Capacity*
- √ *More Accessible*
- √ *Lighter Weight*
- √ *Very Compact*
- √ *Greater Value*

The new S. & J. low pressure breather valve, Model ST-9749, recently introduced, incorporates new values which place it head and shoulders over previous comparable models.

Soon to be available in a complete range of sizes, from 4" through 12", the new design retains the diaphragm type seal and thermosetting phenolic seats pioneered by S. & J., and in addition provides greater safety, lighter weight, increased flow capacities, tighter seal below set operating values, and other features which will keep this breather in the vanguard for a long time to come.

S. & J. Engineers in all of the branch offices below, have transparent models of this new valve available, so that you can see its method of operation right on your own desk. Telephone the office nearest you and ask to see the model of this extraordinary new breather. Specification sheets and prices on request.

**SHAND AND JURS CO.**

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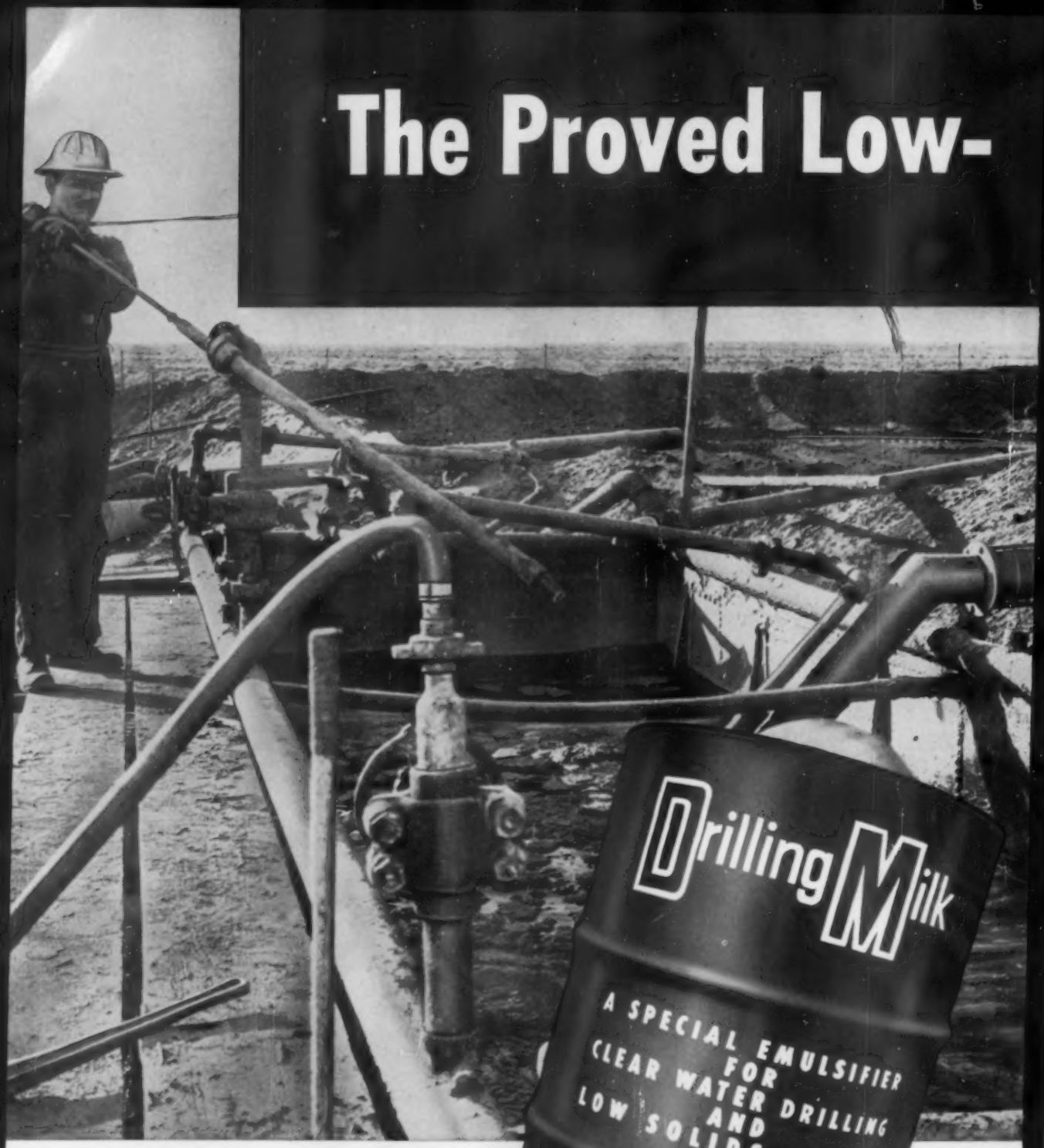
Whessoe, Ltd., Works: Darlington, County Durham

# The Proved Low-



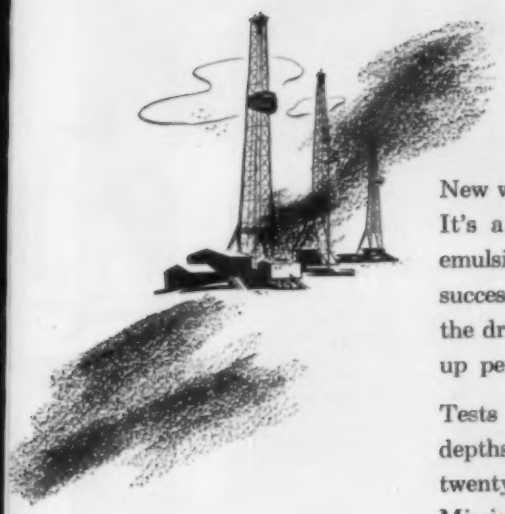

**SEE YOUR MAGCOBAR DEALER**

or write to Magcobar today, for full facts about DRILLING MILK.

**DRILLING MILK Trade Mark*
*Magnet Cove Barium Corporation*

# Solids Drilling Fluid

## *for faster completions*



New wells get on production sooner when you use DRILLING MILK.* It's a low-solids oil emulsion drilling fluid, made with Aquaness emulsifiers . . . the *original* high speed drilling fluid emulsifier. Used successfully in over 500 wells throughout the U.S. and Canada, it's the drilling fluid that has helped to reduce drilling costs by speeding up penetration, reducing bit wear, and lowering completion time.

Tests made on offset wells, in the same formation at comparable depths, prove that this low-solids fluid increased penetration rates on twenty wells in the Permian Basin, 40.9%; on four wells in the Central Mississippi, 26.5%.

**Truer gage hole . . .** needs less cement.

**Lost circulation reduced . . .** mud weights are lighter, pressures are lower.

**Better cuttings and cores** are obtained for geological department.

**Easier mud control . . .** the mud flows like water. Solids drop out quickly. Viscosity is easily increased or decreased. Mud service is reduced to a minimum.

**LOOK FOR THE AQUANESS SEAL**

it identifies the original low-solids, high-speed drilling fluid emulsifier, made by Aquaness for leading mud companies.

ATLAS

***Aquaness*** *Department*

**ATLAS POWDER COMPANY**

**2005 Quitman Street, Houston 26, Texas**

# Here's how to get more for your money in lease production equipment

It is now possible to combine separating and metering in one vessel—for very little more than the cost of a separator alone. ROLOCHECK Metering Separators not only separate oil and gas efficiently, they accurately meter the oil as well.

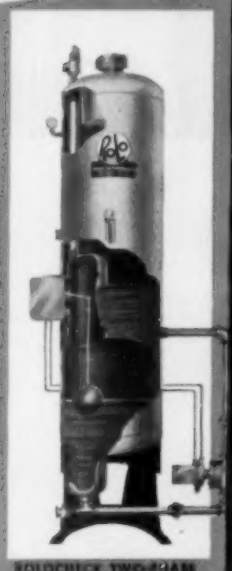
## Use ROLOCHECK Metering Separators as:

**Test Separators**—Automatically separate and meter a well's production on test, enabling tested well's production to be recombined into bulk line to storage. Eliminate test tank and manual test tank gauging.

**Individual Well Separators**—Continuously separate *and meter* production from each well, allowing common field gathering lines and savings in flow lines, tankage and labor. In addition, obtain valuable *continuous* production records.

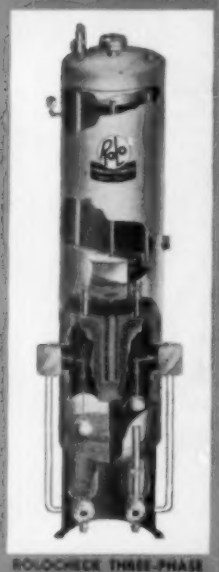
## ROLOCHECK Metering Separators are available in two types:

**Two-Phase Unit** separates oil and gas, metering total liquid. Meter is a genuine ROLOCHECK, designed for and proven in oil field service. Meter alternately fills with a calibrated volume of liquid from the separator section, then discharges this volume to storage. Metered volumes are totalized on a counter.



ROLOCHECK TWO-PHASE METERING SEPARATOR

**Three-Phase Unit** separates oil, water and gas, and meters both oil and free water by means of two ROLOCHECK Meters built right in the vessel. Water can be discharged to disposal after metering.



ROLOCHECK THREE-PHASE METERING SEPARATOR

**Features:**

*Rolo Neutral Position 3-Way Meter Valves . . . assure maximum meter accuracy with no slippage.*

*Efficient separation using monel mesh mist extractors.*

*All sizes and working pressures are available.*

**Optional Accessories:**

*Rolo Automatic Sampler obtains and collects samples from oil meter so that water percentage can be determined.*

*Completely piped gas lines with orifice fittings, gas meters, etc.*

*Special internal coatings to inhibit paraffin deposits.*

*Write for Bulletin 56MS, or see your nearest representative.*

**ROLO MANUFACTURING COMPANY**

P. O. Box 6763 Houston 5, Texas

Midland, Corpus Christi, Kilgore, Wichita Falls, New Orleans, San Pedro, Bakersfield, Ventura, Casper, Tulsa, Mt. Vernon, Edmonton (Alta.), Venezuela: Peticon. Export: R. S. Stokvis and Sons, Inc., 17 Battery Place, New York City.

# They Say—

## Socony and the price hike

"You may have wondered about the effect on our first-quarter earnings of the long overdue increase in the price of crude oil which took place early this year.

"The company did not get anywhere near the full benefit of the increase for two reasons: First, even when product prices fully reflect a crude-price increase, a company benefits only to the extent that the products it sells are derived from its own crude production. Socony Mobil purchases nearly half of the crude oil needed by its domestic refineries. Second, in many markets, increased product prices could not be maintained due to competitive pressures."

*Albert L. Nickerson, president, Socony Mobil Oil Co., Inc., in a statement at the annual shareholders meeting.*

## Tidewater story well-told

Dear Sir:

On the occasion of your May 27 issue of The Oil and Gas Journal, I want to extend you and your associates the heartfelt thanks of the entire Eastern division of Tidewater Oil Co. for the accurate, dramatic, and detailed presentation given on our new Delaware refinery. . . We deeply appreciate your interest and now more than ever before consider your wonderful magazine to be the bible of the oil and gas industry. . .

George F. Getty II
Vice President and General Manager,
Tidewater Oil Co.

## French turbodrill tests

Dear Sir:

I have just read the very interesting article of Mr. J. O. Scott, "What those French Turbodrill Tests Show" (The Oil and Gas Journal, February 11, 1957, page 121). . . . This comparative study of turbodrill and rotary drilling is very interesting but the data available may be insufficient for drawing some of the conclusions.

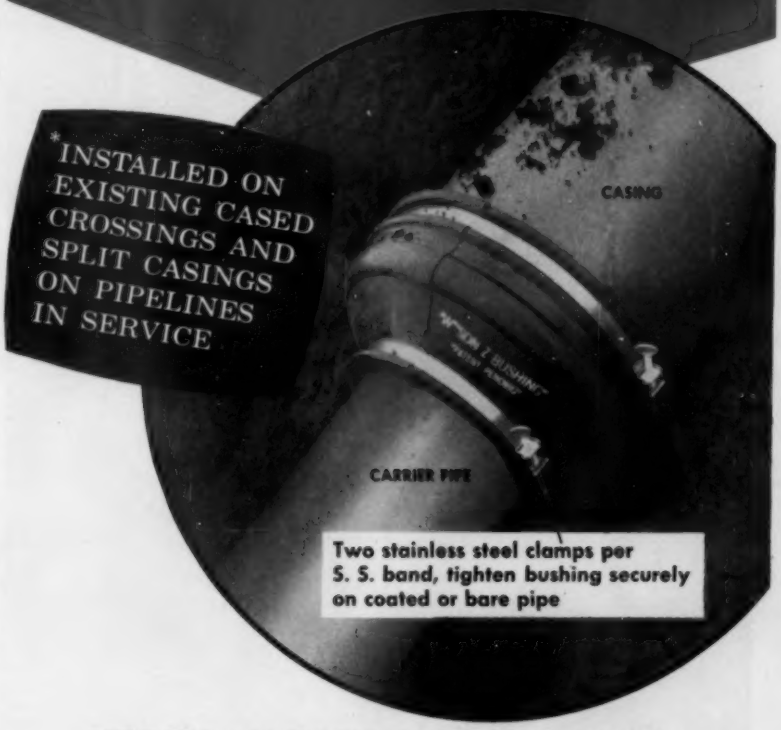
There are two main points which are worth being discussed:

1. The proportionality weight-rate of


They Go Together...

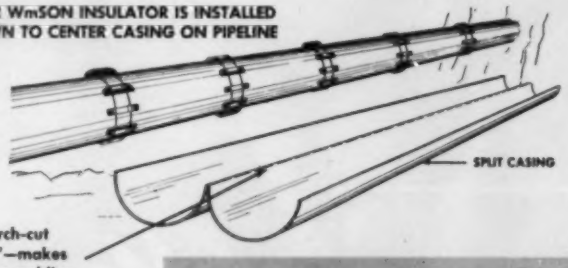
WmSEAL SPLICED "Z" BUSHINGS* for PIPELINES IN OPERATION

*INSTALLED ON EXISTING CASED CROSSINGS AND SPLIT CASINGS ON PIPELINES IN SERVICE




HERE'S AN EASY WAY TO INSTALL CASINGS ON LINES IN SERVICE

EVERY OTHER WmSON INSULATOR IS INSTALLED UP-SIDE-DOWN TO CENTER CASING ON PIPELINE




Interrupted torch-cut forms "hinge"—makes lineup easy for welding around pipe

*Write for bulletin*

*Improved spliced "Z" Bushings are complete with easy to apply cold patch kit.*

T.D.Williamson, Inc.

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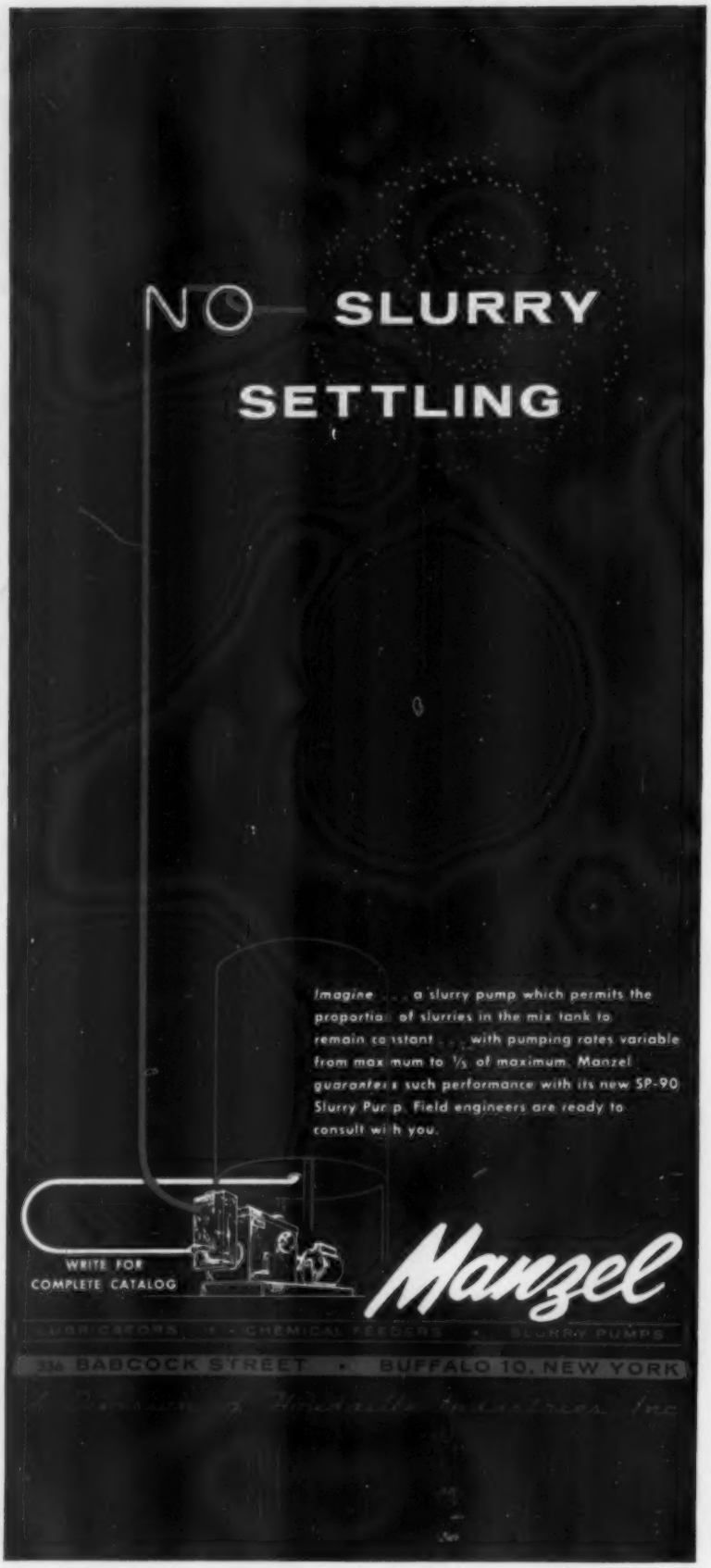
NO SLURRY SETTLING
Imagine . . . a slurry pump which permits the proportion of slurries in the mix tank to remain constant . . . with pumping rates variable from maximum to 1/5 of maximum. Manzel guarantees such performance with its new SP-90 Slurry Pump. Field engineers are ready to consult with you.
WRITE FOR COMPLETE CATALOG
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LUBRICATORS • CHEMICAL FEEDERS • SLURRY PUMPS
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penetration. It seems as if there were for the hard and medium-hard formations two rates of proportionality: one for the rotary speeds and the other for turbodrilling. The absence of data in the intermediate range between 200 and 500 r.p.m. makes it not easy to find confirmation in real drilling. This can be explained by the existence of a crushing limit above which the mechanics of drilling is different.

2. The author writes: "The . . . turbodrill will create a hydraulic thrust. . . . This weight can be put on the bit. . . As long as this amount of bit-weight is sufficient, there is no need for a drill collar to add weight." This assumption, that has for awhile been accepted, does not withstand a thorough analysis.

The drilling string is behaving in turbodrilling exactly as it would with rotary for the same internal and external mud pressures.

The turbine drills apparently straighter holes than the rotary would do with the same weight on the bit and the same drill collar size. This is due to the fact that the turbine itself is behaving as a supersized drill collar, the rotor has a gyroscopical stabilization power in the vertical position, and the pipe above the turbine has to support a very low twist when compared to rotary and does not rotate or rotates very slowly.

W. Tiraspolsky
Consulting Engineer in Turbodrilling,
Manager Bureau de Coordination Technique,
Paris.

## Oil's reluctance to speak

"There is a seeming reluctance for industry employes to write their congressman or to otherwise express individual views on current national problems or pending legislation. Yet to a not inconsiderable extent, that is how government policy and thinking is made.

"Unethical conduct, suggestions of pay-offs through substantial campaign contributions, stories of undue or improper influence, receive wide publicity in the press and by other means out of all proportion to their frequency and to the real significance such incidents may have in affecting the course of Government. These isolated incidents, publicized more by charges, suggestions, and innuendo, than by proof, tend to increase the reluctance of business people to express their views freely and openly.

"Somehow industry representatives are usually characterized as 'pressure groups' and 'special interests' and this again increases their reluctance to stand

# New RCA VHF Radiotelephone

**...TURNS TALK INTO MORE EFFICIENT WORKBOAT OPERATIONS!**

With RCA's new ET-8058 6-channel VHF Radiotelephone you get quick, dependable contact between shore-based offices and vessels, intership contact, safety and calling channels and public telephone correspondence service when used in conjunction with AR-8519 Auxiliary Receiver. You make as many calls as you want—no waiting for a line, no delays in giving or receiving information. Just pick up the phone and schedule, dispatch, report and institute last minute changes that cut hours off job-to-job sailing... improve overall operating efficiency... assure less waste, more profits!

If you operate workboats, fishing craft or small vessels in harbors, at sea or in inland waterways, you'll find this rugged RCA radiotelephone invaluable for 101 uses during the busy days ashore or afloat. Write for bulletin M-3005 giving complete product information and specifications.

## Other RCA Marine Equipments for the Workboat Fleet

**RADAR**—RCA's CR-105B "workhorse" radar as an aid to safe navigation through foul weather and other traffic hazards. Ideal for vessels with space and power limitations. Indicator requires only two square feet of deck space, antenna is lightweight. Provides instant selection of 1-2-4-12-32-mile ranges on bright 10-inch scope.

**DEPTH RECORDER**—RCA Model LAZ-13A Recording Depth Sounder Echograph accurately records depths, warns of rocks, wrecks and other underwater hazards. A sensitive, accurate navigational instrument. Ideal for fishboats, workboats, all small craft!

**LORAN**—RCA LR-8803 Direct-Reading Loran is compact, economical, easy to operate! Make quicker, safer passages using Loran system of long-range radio navigation.

- **DEPENDABLE**
- **ECONOMICAL**
- **FLEXIBLE!**

- **Covers any six channels within a 1.1 mc range in 148-174 mc band**
- **30 watt output**
- **Remote frequency control**
- **Automatically reverts back to any predetermined channel after completion of call**
- **Operates on 115 V AC, 60 cycles**
- **Control unit provides for channel selection, power on-off, volume control, squelch, dimmer control**
- **FCC type accepted!**

**AUXILIARY RECEIVER**—Model AR-8519 Auxiliary Receiver adds further versatility to the RCA VHF Radiotelephone system... provides facilities for transmitting on one frequency while receiving on another during the same transmission!

***Write for free information today!***

RCA -Tmk(s)®

**RADIO CORPORATION of AMERICA**

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NEW YORK 13, N.Y.

# WILFLEY SAND PUMPS

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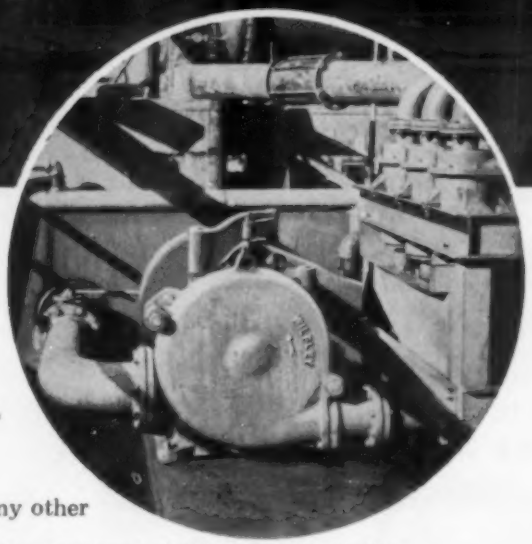

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up and take a position. Any pressure these groups exert is small compared to any voice which purports to represent the public. The mere mention of the public immediately conjures up an image of vast hordes standing before a voting booth. Fortunately there is usually enough good leadership and sound thinking in Congress to recognize that what is good for the business economy is also good for the public and vice versa. However, your representatives in Government cannot carry the load without the wholehearted and articulate support of all interested persons."

*John Ferguson, executive director, Independent Natural Gas Association of America, in a speech at the Texas A. & I. Management Conference, Kingsville, Tex.*

## Oil locked up without a key

"If the time should unfortunately ever come when we would find ourselves a 'have not' nation in oil, then our days of world leadership would come to an end quickly.

"It is absurd and impractical that America should import more oil from abroad, meanwhile 'locking up' its own reserves for the hour of emergency.

"If we follow this unwise course, when the time of emergency does come, the oil reserves we have 'locked up' will be just as unavailable as the oil of the Middle East. They will be locked up so tight that any modern war would be over long before we could get the key to the door. Oil reserves in the ground are utterly worthless for any immediate, practical purpose unless they have been developed, with provision for all necessary facilities to refine and transport them."

*Walter S. Hallanan, president, Plymouth Oil Co., in a speech before a meeting of the National Tank Truck Carriers, Inc.*

## Credit in tight money times

"Most economic indicators point to a continuation of the present high level of business activity in the months immediately ahead . . . The demand for bank loans probably will be strong. This demand for funds will occur at a time when the banking system appears to be approaching the limit of its loan expansion capacity . . .

"Speaking quite frankly, oil and gas producers have been very good borrowers, but very poor depositors. With money as tight as it is today, there will be a tendency to give first consideration to those borrowers who maintain adequate compensating balances. In addition, it will become increasingly difficult to obtain credit for purposes other than the expansion of productive facilities."

*Glenn M. Forgan, vice president, First National Bank of Chicago, in a speech before the Texas Independent Producers and Royalty Owners Association.*

## Progress in the Middle East

"Nations which have achieved independence have . . . an obligation to apply revenues obtained from foreign investment to productive uses within thier own borders. In this regard, I believe the Middle East has suffered from some rather exaggerated stories featuring the theme of fancy automobiles and plush palaces. The fact is that a great deal of constructive and forward looking work is being financed in this area.

"Iraq has a comprehensive development program, and Iran is promoting similar long-range activities. In Saudi Arabia, schools are being built faster than teachers can be found, and hospitals faster than doctors and nurses can be obtained. All-out campaigns are being waged against diseases which have been the scourge of the country for generations, particularly malaria

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and trachoma. Everything considered, I think it is remarkable that these countries are moving into the twentieth century at such a rapid pace."

*Augustus C. Long, chairman, The Texas Co., in a speech before the New York Chamber of Commerce.*

# CALENDAR

**JUNE**

**26-29** American Association of Cost Engineers, first national meeting, University of New Hampshire, Durham, N. H.

**JULY**

**8-19** Industrial Statistics for the Process Industries, second annual conference, sponsored by American Society for Quality Control and the University of Oklahoma, Lockett Hotel, Norman, Okla.

**AUGUST**

**1-3** Rocky Mountain Mineral Law Foundation, third annual institute, Montana State University, Missoula, Mont.

**19-20** North Dakota Oil and Gas Association, annual meeting, Bismarck, N. D.

**26-28** Seventeenth annual Appalachian Gas Measurement Short Course, West Virginia University, Morgantown, W. Va.

**28-30** Instrument Society of America, International Symposium on gas chromatography, Kellogg Center, Michigan State University, East Lansing, Mich.

**SEPTEMBER**

**3-5** Pacific Coast Gas Association convention, Fairmont and Mark Hopkins Hotels, San Francisco.

**5-7** New Mexico Geological Society, eighth annual field conference, southwestern Colorado.

**8-13** American Chemical Society, 132nd national meeting, New York City.

**9-10** Independent Natural Gas Association of America, annual meeting, Shamrock Hilton Hotel, Houston.

**9-11** American Institute of Electrical Engineers, petroleum industry conference, Sheraton Hotel, Philadelphia.

**11-13** National Petroleum Association, fifty-fifth annual meeting, Traymore Hotel, Atlantic City, N. J.

**19-21** Rocky Mountain Oil Show, fairgrounds, Casper, Wyo.

**22-25** American Society of Mechanical Engineers, petroleum mechanical engineering conference, Mayo Hotel, Tulsa.

**23-25** American Society of Mechanical Engineers, fall meeting, Statler Hotel, Hartford, Conn.

**26-27** Western Petroleum Refiners Association, Rocky Mountain regional technical-industrial relations meeting, Henning Hotel, Casper, Wyo.

**26-27** Mid-Continent Oil and Gas Association, Louisiana - Arkansas division, Roosevelt Hotel, New Orleans.

**30-Oct. 2** American Oil Chemists' Society, 1957 fall meeting, Netherland Plaza Hotel, Cincinnati.

**OCTOBER**

**1-2** Texas Mid-Continent Oil and Gas Association, thirty-eighth annual meeting, Texas Hotel, Fort Worth.

**2-4** Golden Trend Oil Show, Pauls Valley, Okla.

**6-9** Society of Petroleum Engineers of American Institute of Mining, Metallurgical, and Petroleum Engineers, fall meeting, Adolphus, Baker, and Statler Hilton Hotels, Dallas.

**7-9** American Gas Association, annual convention, Kiel Auditorium, St. Louis.

**7-11** American Institute of Electrical Engineers, fall general meeting, Morrison Hotel, Chicago.

**10-11** California Natural Gasoline Association, thirty-second annual fall meeting, Huntington-Sheraton Hotel, Pasadena.

**10-12** American Society of Mechanical Engineers, American Institute of Mining, Metallurgical & Petroleum Engineers, fuels conference, Chateau Frontenac, Quebec.

**13-15** American Association of Oilwell Drilling Contractors, seventeenth annual meeting, Mayo Hotel, Tulsa.

**17-18** American Institute of Mining, Metallurgical, and Petroleum Engineers, Southern California petroleum section, fall meeting, Biltmore Hotel, Los Angeles.

**17-19** Four Corners Geological Society, second field conference, Gallup, N. M.

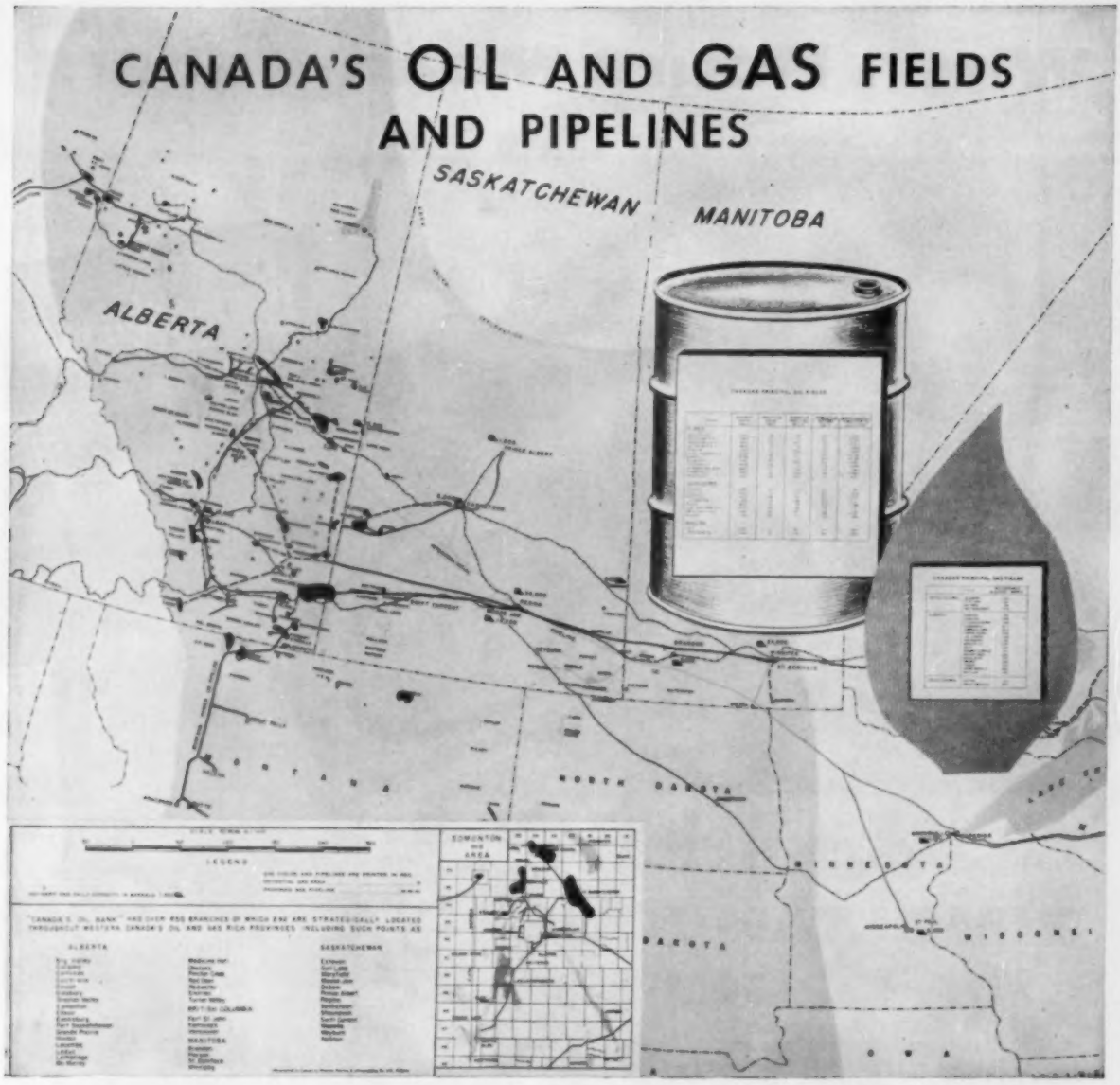
**20-22** National Association of Oil Equipment Jobbers, annual convention and trade show, Hotel Peabody, Memphis.

**24-25** Western Petroleum Refiners Association, regional technical-industrial relations meeting, Rufus Garrett Hotel, El Dorado, Ark.

**25** Natural Gasoline Association of America, southern regional meeting, Washington - Youree and Captain Shreve Hotels, Shreveport.

**27-29** Independent Petroleum Association of America, annual membership meeting, Statler Hilton Hotel, Dallas.

**31-Nov. 1** American Association of Petroleum Geologists, Mid-Continent regional meeting, Cimarron Ballroom, Tulsa.

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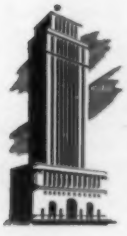
We do not provide information on oil securities.



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# JOURNALLY SPEAKING

## The Over-Genial Host

HERE WE GO biting the hand that feeds us. We expect to be summarily expelled from membership in the Freeloaders Association of America. But frankness impels us to rebel against excessive entertainment and hospitality at oil-industry meetings and conventions.

We said "excessive" entertainment. A certain minimum is probably essential. A little more is all right. But hospitality can get out of hand. And it has got out of hand at a number of industry gatherings in recent years. We have been the gluttonous recipient of quite a bit of it and we can freeload with the best of them, but our conscience twinges now and then.

What gripes us the most is to hear that the entertainment committee put the screws on suppliers, bankers, or local oil companies to pick up the tab for a more elaborate party than somebody else threw at some other meeting. That is not "hospitality" as we understand the term. Nor are we mollified with the shrugged explanation that the dragooned hosts will probably charge it off as advertising or business expense.

It's almost as bad when the various supply companies and others voluntarily (really voluntarily) ask to provide free meals and fellowship hours for those registered at a convention. This is because false pride and the competitive spirit so often lead them to try to outdo each other in lavishly putting on the dog.

An example of this is the annual A.P.I. meeting. The A.P.I. itself schedules absolutely no entertainment, not even the banquet which is so traditional at most conventions. And the A.P.I. officials profess to discourage excessive entertainment by suppliers. Yet some of the parties at some of the A.P.I. meetings have resembled the fabled bacchanalian revels of oriental potentates.

It doesn't help the industry's public relations any to have stories about such convention parties spread around in the press. But that's not the chief objection. The chief objection is that excessive entertainment detracts from the purposes and objectives of a convention.

What is a proper amount of entertainment at a convention? Let's start with the precept that the main purpose of a convention is to discuss business matters and exchange information on technical problems. If it takes an elaborate schedule of entertainment to attract a respectable number of registrants, the suspicion is that the meeting program is so weak that the convention isn't worth attending on its merits.

A secondary purpose of a convention is to get people in the same activity to meet and know each other. This does require some facilities for informal sociability. Everybody has to eat, most people want a little relaxation during a meeting, and quite a few enjoy a drink and a couple of hors d'oeuvres before dinner. So a general luncheon, banquet, or social hour serves a very useful purpose—provided it is confined to that purpose. Sometimes these sideshows overshadow the main event.

Now everybody in the oil industry isn't rich. There are many groups and categories of people connected with oil who have valid reasons for holding conventions but who have modest salaries and expense accounts. In such cases it is fitting and proper for oil or supply companies to aid the cause by underwriting a reasonable portion of the convention expenses.

People who have business or professional reasons for going to meetings shouldn't expect to be complete freeloaders. And those who don't shouldn't attend anyway. Too much partying can prevent a convention from accomplishing much worth while.

Let's cut this hosting business down to size and view it in its proper perspective. A little is fine but too much is a nightmare. Nobody but the caterers and professional entertainers would have a legitimate complaint against a conspiracy in restraint of competition in convention entertaining.

But of course if people are going to insist on throwing fancy shindigs, we hope we get invited to the best of them. We're no martyr.

—*Henry D. Ralph.*

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# Crude postings need adjusting, not junking

THE price of crude oil should go up 4 cents a barrel to compensate for the 6 per cent increase in oil worker's wages, says President Robert L. Wood, of the Independent Petroleum Association of America.

He is right. Producers generally are in poor position to absorb labor and other cost increases. They shouldn't be expected to. Crude prices should not remain rigid for long periods and then jump all at once. They should fluctuate moderately to reflect cost and market conditions.

But crude prices are set by the buyers, not the sellers. And refiners are not vitally concerned with the cost problems of their suppliers. They have their own wage increases to try to cover out of their products prices. Nor can they be blamed for trying to buy their raw material as cheaply as possible.

DISSATISFACTION with the crude price-posting system is growing among independent producers. Several associations are undertaking studies with a view to suggesting fundamental changes. They think the system is not only too inflexible but often discriminatory.

The fundamental trouble, from the producers' standpoint, is that producers do not market their crude. For decades they have been content to bring oil to the surface and let buyers come and get it. So it is the buyers who determine what and where they will buy, what they will pay, and where the crude will go.

To the credit of the industry it must be said that, by and large, crude-oil buyers have been exceedingly conscientious—sometimes even magnanimous—in finding a home for crude and paying fair prices for it. But the fact remains that the entire marketing system is in their hands and sellers have little to say about it.

On the whole the system has worked well except for its slowness in reflecting changes in values and differentials—and this is not an unmixed evil. When crude supply is in approximate balance with demand, buyers will go to great lengths to accommodate sellers, and producers are pretty happy with the system.

BUT WHEN CRUDE IS LONG, buyers are less solicitous and some flaws show up in the posting system. That is the situation today, and it probably will continue so long as oversupply continues.

Producers would be in more trouble than they are now if they should attempt to junk field postings and the historic method of selling crude. Each one might have to peddle his own crude at refinery gates.

The best course is to work with purchasers in correcting minor imperfections in the system—while redoubling efforts to eliminate oversupply and restore the crude balance upon which the system depends for satisfactory functioning.

# Good Wells Make Good News

**June 17, 1957**

Dowell engineers can tailor acidizing to serve a variety of purposes and to give profitable results in a wide variety of formations. Here are some recent examples:

- **Harrison County, East Texas** (New Gas Well): The upper zone of a dual completion well was completed in a six-foot section of the Pettit oolitic lime at 6300 feet. Well was acidized with 500 gallons Mud Acid, 7000 gallons Dowell Retarded Acid and 7000 gallons Dowell Regular Acid. Two Allison-powered pumpers delivered acid down annulus at 2500 psi and 19 bpm. After treatment, well tested *40,000,000 cfpd open flow with 60 barrels petroleum liquids per million.*

- **Greenwood County, Kansas** (Old Well, Water Injection): Drilled in 1924 to Bartlesville sand (1847 to 1947 feet). Before acidizing, injection rate was 2 bwpd at 590 psi. Operator ran two-inch tubing and packer to protect casing. Well was treated by Dowell with 500 gallons Regular Acid followed by 50 pounds magnesium pellets suspended in 500 gallons water. 500 gallons Stabilized Acid was then injected at ¼ to ½ bpm. *Nearly one year after treatment injection rate was 287 bwpd at 505 psi.*

- **Park County, Wyoming** (New Well): Drilled into the highly soluble Phosphoria lime of the Silver Tip Pool. Open hole, 8620 to 8664 feet. Initial production—80 bopd. Analysis of sour crude indicated probable presence of iron sulfide in tubing. To prevent precipitation of iron hydroxide in formation, Dowell used Stabilized Acid. 3000 gallons were injected down 2½" tubing at 2.7 bpm and 1400 psi maximum. One week after treatment well was producing 130 bopd with no sign of plugging. *Operator considered these results unexpectedly good.*

- **Midland County, West Texas** (New Well): Completed in the Devonian dolomite 11,094 to 12,032 feet. Solubility averaged 88 per cent. Dowell pumped 40,000 gallons of Retarded Acid down casing annulus at 3800 psi. Average injection rate was 16 bpm. On test, well produced *312 bpd of 53.5 gravity oil through 18/64" choke.*

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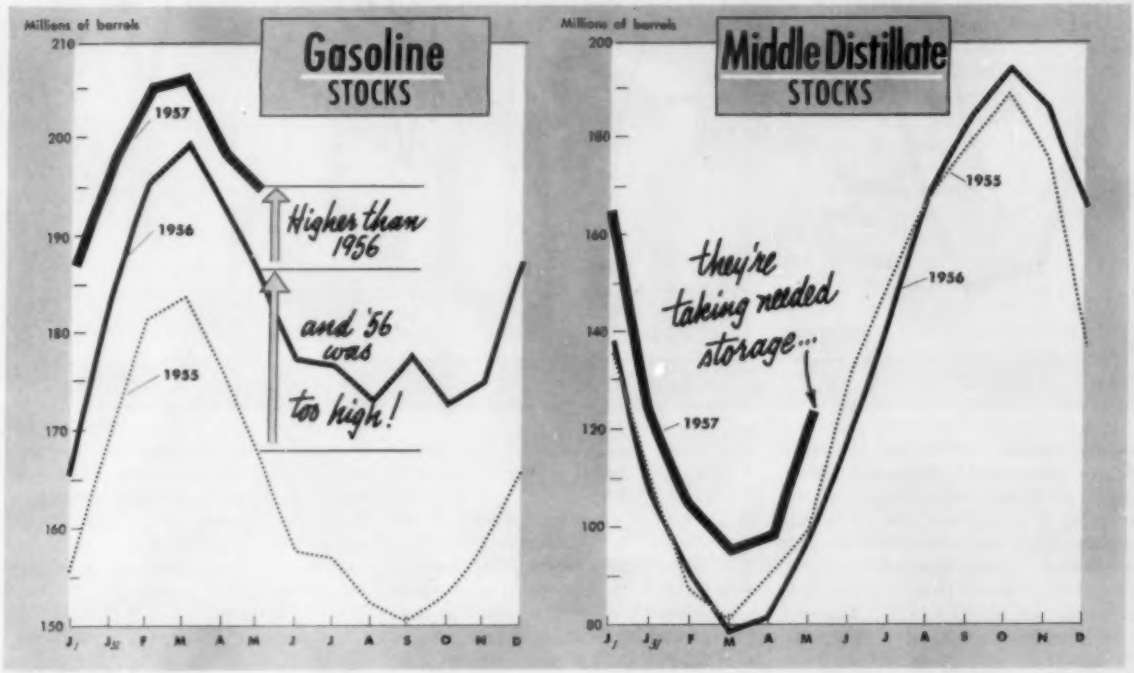



# High Stocks + Low Demand = Trouble

IN RECENT YEARS domestic refiners have learned from experience a stern lesson. They must live well below the capacity of their plants or produce themselves into bankruptcy.

That's a simplified explanation for the series of cutbacks in crude runs to refineries starting in the industry.

Present capacity of 9,569,182 bbl. daily for the nation's refineries is nearly 1,500,000 bbl. daily above normal refinery runs. That gives refiners a wide production latitude. But if they miss estimating future markets very much, stocks of products quickly become excessive. The market softens, and price wars pop up all over.

The only answer: Quit overproducing the market and let demand catch up. And that's what refiners are slowly beginning to do.

**What happened . . .** This spring refiners ran smack into a double squeeze.

**. . . Demand** didn't live up to expectations.

**. . . Middle-distillate stocks** left over from the heating season were too high, 25 per cent above a year ago.

The result was that product stocks began building up to such an extent they not only softened the market at the beginning of the motoring season but threatened to depress the market all summer.

Some refinery men claim that gasoline stocks are too high. Others say that middle distillates are out of balance. The fact is both are too high. Since both are classified as clean products, they both occupy space in clean storage.

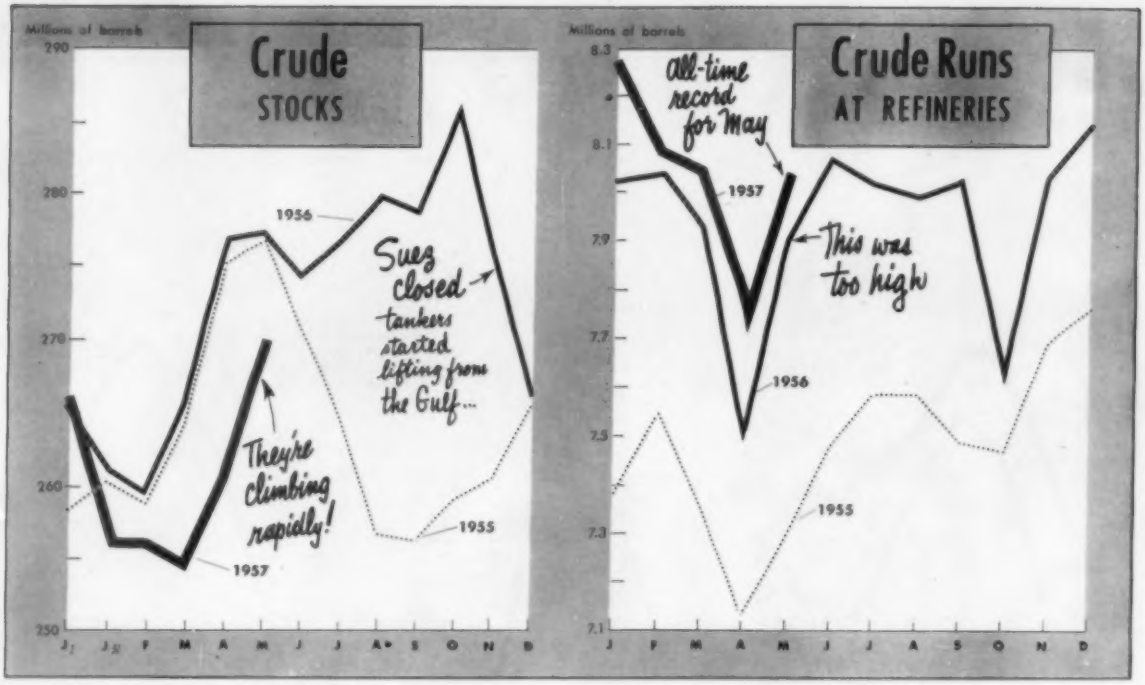
Statistics bear out that both stocks have outstripped the climb in demand.

Middle-distillate stocks amounted to about 123,000,000 bbl. at the end of May, up about 26 million barrels since the end of May 1953. This represents a gain of about 6.5 million barrels per year or an increase of 26.6 per cent for the 4-year period.

Gasoline stocks totaled about 195,000,000 bbl. at the end of May. That's an increase of 40,400,000 bbl. in the 4-year period. This amounts to a little more than 10 million barrels per year and an over-all gain of 26 per cent for the 4-year period.

Now, compare the demand picture with these stocks. Gasoline demand so far this year has been about 18 per cent more than for the first 5 months of 1953. Distillate demand for the first 5 months has been up almost 26 per cent over 1953. But a big slug of this increase was due to shipments to Europe during the Suez crisis.

Actually distillate demand has increased about the same as stocks, but the season is over for it. Distress sales to Europe are also over. Customers will be hard to sell on summer fills to relieve storage because they will be looking for lower prices later.




**An explanation . . .** Refiners generally blamed unseasonable weather for both prongs of the squeeze. Here's why:

Spring this year was slightly warmer than last year, when cold weather extended well into May. As a result, the 1957 demand for burning oils ended sooner than in 1956. This left over a sizable stock of middle distillates at the end of the season.

At the same time heavy rains swept much of the country in late April and May this year. Farmers couldn't get into their fields to plow or plant. Motorists couldn't hit the highways in large numbers for early vacations. Much industrial activity dependent on motorized vehicles slowed down.

All this compounded to drive down the demand for motor fuel. Whereas refiners had based their operations on an expected increase of 4 to 5 per cent in demand, actually the products demand for May was nearly what it was last year. The products refined to meet the expected increase in demand became a burden. Much of it had to go to storage. But there it ran into the hangover of middle distillates. Storage became tight, and refiners looked for ways to cut it down.

**Other causes . . .** Some analysts think there may be an added explanation of the overproduction.

These folks say refiners may have been lulled into a false impression of the market by exceptionally good business during the Suez crisis. Demand then was very good for the middle distillates and residual fuel oils and better than usual for gasoline.

This may have prompted refiners not to cut back crude runs to stills as much in April as they should. April traditionally is the month for refinery turnarounds, when plant repairs and yield shifts are made, and when production is low. This year the cutback was late in coming and wasn't too drastic, with runs staying well above 7.5 million barrels daily of crude. On the basis of hindsight, they point out that a drastic cutback in April might have resulted in a much better market outlook now.

Other factors explaining the failure of demand to increase as expected also were mentioned by refinery officials over the country. These were:

**. . . New car sales** are running below expectations.

**. . . The highway program** did not get under way as quickly as expected.

**. . . General economic slow up** has set in. Carloadings, for instance, are down and steel sales also are soft.

**What's ahead . . .** Most refiners say they do not consider present product demand as a trend.

They believe with good weather the picture will improve and demand will start running nearer estimates of 4 to 5 per cent above last year. If refinery runs meanwhile are kept lower throughout June, the market will firm up, and the excessive stocks can be worked off.

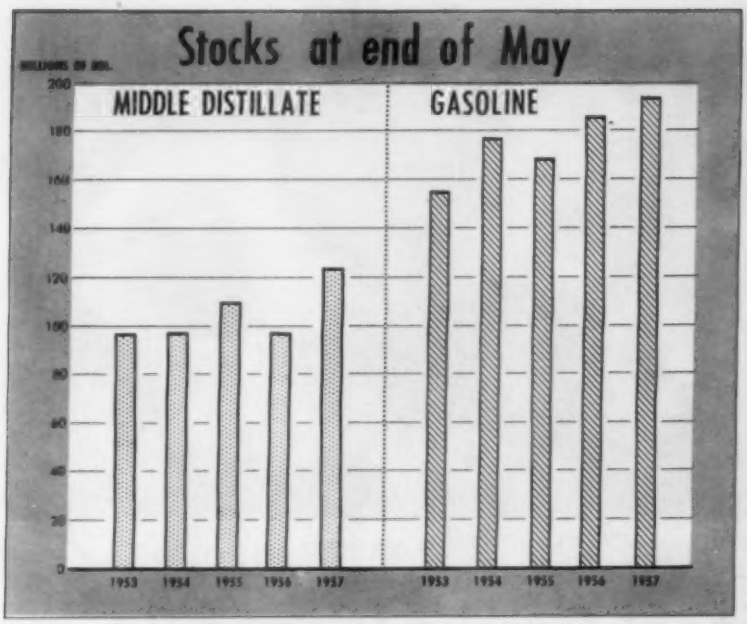
These may be optimistic views, however. Most of the driving season will be under a depressed market. The one bright hope is this: Since it's near the start of the major gasoline season, if supply is reduced quickly, there is a chance that prices may strengthen by midseason.

One refiner sees imports as a factor clouding the future. R. W. McDowell, president of D-X Sunray Oil Co., observed: "The U. S. domestic oil industry is drowning itself in a sea of refined products, the direct result of continued excessive crude runs and unreasonably high foreign oil imports."

He emphasized this dilemma: Oil-producing states are reluctant to reduce crude production because they don't want to lose their markets to imports. Refiners in these states are trying to take this crude and refine it even in the face of adverse demand. McDowell suggested a nationwide 6 per cent cut in refinery runs aided by a firm reduction in imports to return a reasonable balance to supply and demand.

Other estimates on the outlook for the rest of 1957 include these from top refinery executives who asked to remain anonymous:

**. . . Signs of a pickup** already are in evidence in the East with the weather warming up some. Demand should also improve if new car sales pick up and the road program gets going full swing. This official expresses fear for prospects of distillate fuels, however. Residual-fuel demand also is actually below 1956 in first quarter because of lower industrial activity.




... **A 2½ per cent cut** in runs for 30 to 45 days would stabilize the industry, another says. Demand should catch up with expectations by July 1. But because of poorer than anticipated first half, demand for the year will be nearer 3 to 3.5 per cent above last year. Rains in southwest should even help later demand.

... **The squeeze now** is on refinery margins. This official doubts if there will be sufficient immediate correction because "the industry is always exceedingly slow to recognize trends" and predicted: "Something will be done only when the industry feels it in the pocketbook."

... **Demand for the year** will be off expectations—perhaps a 3½ per cent gain over 1956 rather than 4 per cent.

... **Stocks of gasoline** are 31,000,000 bbl. too high and runs should be cut back 5 per cent by everyone. Residual fuel may never regain its position, this man says, because industrial concerns with standby facilities are now using alternative fuels which are cheaper than residual today.

**Who has cut . . .** Nine refining companies announced cuts totaling 88,500 bbl. daily for June. Strikes at plants of four other companies idled an additional 259,000 bbl. of capacity. Other firms revealed plans for reduced runs over longer periods.

Companies announcing voluntary cuts included:

... **Esso Standard** — 14,000 bbl. daily under May. The reduction replaces a planned increase of 11,000 bbl. daily. As a result of this and previous moves, Esso's runs in June will be 55,000 bbl. daily under those for the same month last year.

... **Shell**—15,000 bbl. daily east of the Rockies.

... **D-X Sunray**—14,000 bbl. daily or 13 per cent.

... **Sinclair**—12,000 bbl. daily.

... **Cities Service** — 10,000 bbl. daily.

... **Magnolia**—10,000 bbl. daily.

... **Socony Mobil**—5,000 bbl. daily.

... **Continental**—4,500 bbl. daily in June, July, and August.

... **Carter**—4,000 bbl. daily in June in Rockies.

In addition these companies revealed new refining plans:

... **Humble** said its runs for first 8 months of 1957 will average 22,200 bbl. daily less than for the same period in 1956.

... **Phillips** said it cut 14,500 bbl. daily from its runs in May and earlier had reduced runs 9,000 bbl. daily in April.

... **Standard of Indiana** announced its runs for June will be 11,000 bbl. daily less than for the same month last year.

**Strike cuts runs . . .** Five major refineries of Standard Oil Co. (Ohio) with capacity totaling 137,000 bbl. daily were shut down by the newest oil industry strike last week.

Members of the Oil, Chemical and Atomic Workers Union struck at the plants in a dispute over the effective date of a wage increase. Plants closed are located at Cleveland, Lima, and Toledo, Ohio, and Latonia, Ky.

The company had agreed to the union's demand for a 6 per cent pay increase but made it effective in the pay period in which the contract was signed. The union asked that it be retroactive, with 5 per cent more being given for April and stepping up to 6 per cent on May 1.

The same union struck Socony Mobil Oil Co.'s East St. Louis refinery, idling 40,000-bbl. daily capacity. Negotiations broke down there also over the retroactive date of a general 6 per cent wage increase.

Two other refiners still remained shut down by strikes called earlier. They involved Pure Oil Co.'s 45,000-bbl. plant at Lemont, Ill., and Crown Central Petroleum Co.'s 37,000-bbl. plant at Houston.

**Ever-widening circle . . .** The refinery cutbacks and strikes may increase pressure on producing states also to reduce crude production.

First indication of things to come was Magnolia Petroleum Co.'s announcement it was reducing its crude purchases 15 per cent in June. The cut affects all purchases in Texas, Oklahoma, New Mexico, and Illinois. Magnolia attributed the action to the cutbacks and strikes at refineries it serves with crude.

Other production cutbacks may follow.

A protracted strike, for instance, at the Ohio plants could affect operations of Sohio Petroleum Co., the producing affiliate of Ohio Standard. The Ohio plants receive their crude from southwestern and southern fields.

Pure's plant, also served by Mid-Continent production, carried excess crude stocks at the time the strike started and is expected to start cutting crude purchases if the walkout lasts much longer.

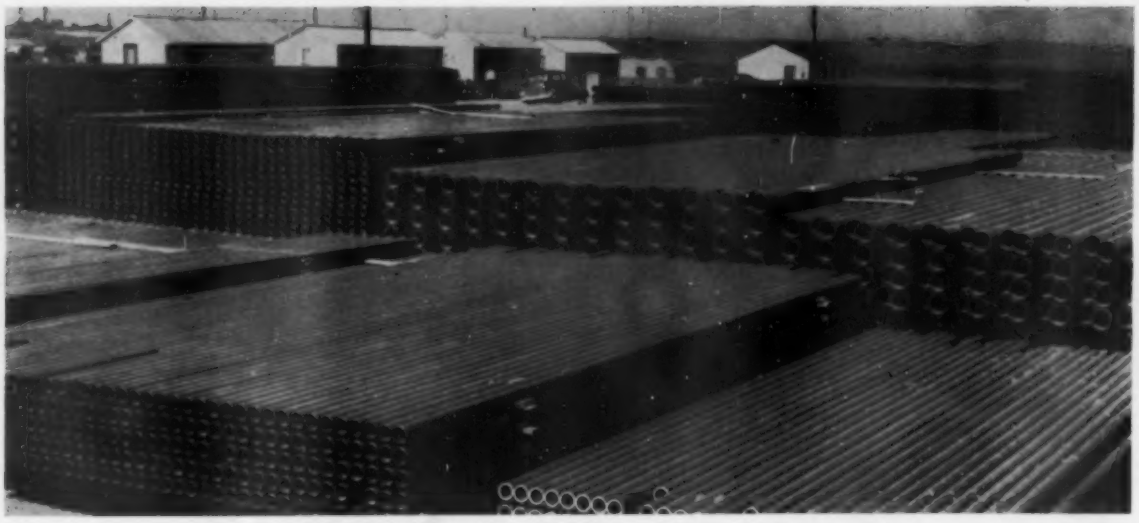
The Crown Central shutdown already has brought reduced allowables in South Texas fields.

D-X Sunray's McDowell emphasized the threat to production from the voluntary refinery cutbacks. He said:

"Everyone knows that if refinery runs are reduced, production of crude oil in various states must also be reduced, or industry economic chaos sets in like a plague."

The Texas Railroad Commission will face up to this question at its meeting this week. The commission is expected to order a 14-day producing month for July. It would be the first time in years the big producing state had gone to 14-day production during a 30-day month.

Commission Chairman Olin Culbertson even indicated last week a more drastic cut to 12 days may be considered to relieve present overproduction.



**NEW PHENOMENON for steel: Supply catches up with demand.**

# Oil-Country Steel Grows Plentiful

THE STEEL INDUSTRY is encountering a softer market for its products in the oil country. Supply is catching up with demand on most items.

But suppliers say there's nothing serious in the outlook. The over-all oil-country demand for steel is still good. It's so good, in fact, that most concede steel will be able to advance prices again in July, the third time within a year for the oil industry.

The large suppliers who termed the oil-country market spotty pin-pointed these developments:

... **Deliveries** are nearly current now. Only a few months ago some mills were as much as 3 months behind.

... **Cancellations** of advanced bookings are becoming more prevalent. They are not a problem, however, because salesmen have been able to spot the orders with other buyers wanting immediate delivery.

... **Extra tonnage** has been diverted to oil-industry needs.

**What's happening . . .** This situation is a far cry from last summer when a steel strike jumbled supply and hit operations throughout the oil industry.

At that time drilling contractors had to stack rigs. Timetables for refining, pipeline, and development projects were set back from 2 to 3 months. Since then the steel mills have been able to pick up the slack in production. They also have been helped by these factors:

... **Oil men reduced buying** slightly and started living more off their steel inventories. This trend was mentioned by a majority of supply-company representatives as having a softening effect on the market. How long it will continue is anyone's guess.

... **Buyers also are tailoring** their orders to short-term company needs.

... **Drilling activity is down,** and this has put a crimp in steel purchases.

... **Bad weather** also has slowed operations in much of the oil country.

... **Slack demand in some industries,** particularly automobiles, has made some steel available for other industries. The best case of this is the steel being used in a crude pipeline from the Four Corners area to Los Angeles. It was picked up from tonnage which the auto industry couldn't use.

**The outlook . . .** The present buying trends have prompted many suppliers to warn oil men they may run into trouble.

One supplier put it this way: "One day the men in the front office will open the door and say, 'start drilling those wells.' The buyer whose company has lived off its inventory too long then will have to scramble for casing and drill pipe.

"We may have it and we may not. If everyone comes into the market at the same time, the situation will be like it was a year ago with everyone wanting goods at once."

On the other hand, industry buyers say oil-country steel inventories have been rather high and the trend to reduce them is only a natural one. It also reflects, some say, the availability now of supplies.

There's obviously nothing critical about the situation. One supplier reported he already was booked solid for the third quarter. Another has the second quarter allotment booked and has a good start on third-quarter business. And one supplier of specialty goods has nearly all the third quarter booked, with bookings heavy for the fourth quarter.

**Prices up again . . .** At least one thing appears certain about the steel business: Prices will go up in July.

Every supplier concedes that. The only question is how much the increase will be. Talk ranges from $6 to $8.50 a ton on the basic price. By the time this goes down the line to finished oil-country goods and other products used by the oil industry, any basic increase usually is almost doubled.

This specter of higher prices might be expected to cause "scare" buying among oil companies as a hedge. But it doesn't work like that. Both oil company buyers and suppliers report very little outright hedge buying. Suppliers concede the approaching price hike might be a factor in many companies keeping their orders on the books.

Company buyers explain, however, that buying above foreseeable needs is too expensive. The costs of warehousing and double handling easily could wipe out any price savings.

Steelmakers explain the coming in-

crease will be needed to meet additional wage costs under the industry's 3-year wage contracts with the United Steelworkers Union. Last year when the workers were granted a 20-cent hourly pay boost, basic-steel price advanced $8.50 a ton.

Just how much the workers' pay increase will cost steel this July is a disputed question.

United Steelworkers contend the second-year boost is only 12½ cents an hour.

The steel companies say this actually is 18.9 cents an hour when social security and other costs not negotiated in the wage raise are considered. This, they also say, does not include automatic pay increases won by the workers as cost-of-living adjustments. Such an adjustment amounted to 3 cents an hour last January and a similar jump is expected in midyear. Thus the payroll costs, according to steel-company figures, may be nearer 25 cents an hour higher this year.

The American Iron & Steel Institute in a recent statistical study reported the total employment cost per hour for steel companies last December was $3.058. The average hourly earnings that month for steelworkers were $2.621. By way of comparison, in 1950 the total employment cost was $1.908 and the average hourly earnings $1.691.

United Steelworkers President David J. McDonald, however, got in a few blows at steel-industry pricing habits. He declared in Washington last week the companies are "irresponsible" in their pricing and could pay the higher wages July 1 and still hold the price line.

**How much?** . . . McDonald's selection of Washington as the scene of his blast merely emphasizes the political overtone to this year's steel pricing.

McDonald spoke before a union gathering. But in Washington his remarks could easily be expected to be picked up by inflation-minded congressmen. Washington observers have been reporting privately for months that big steel is being put under subtle pressure by both Congress and the administration to hold the line on prices.

Whether this Washington pressure and the natural complaints of steel's customers will prevent the price increase is highly doubtful. It could temper the amount of increase, however.

The time-honored formula for steel price increases in 40 cents a ton increase for each penny of higher wages. Under this ratio the range of increase could be $5 to $10 a ton, depending on whose wage costs are used. The increase figure most often mentioned, however, is $7.

Even a $7 hike would add a minimum of $42 million to the oil industry's annual steel bill, based on use of 6 million tons of steel. Actually, it could mean nearly twice that when higher labor and materials costs are added down the line by mills, fabricators, shops, and in the field. Also the extra costs will be felt by other items used by oil men, such as trucks, engines, pumps, etc.

**A regular thing** . . . This July's price increase on steel will mark the fifth jump the oil industry has taken since 1955.

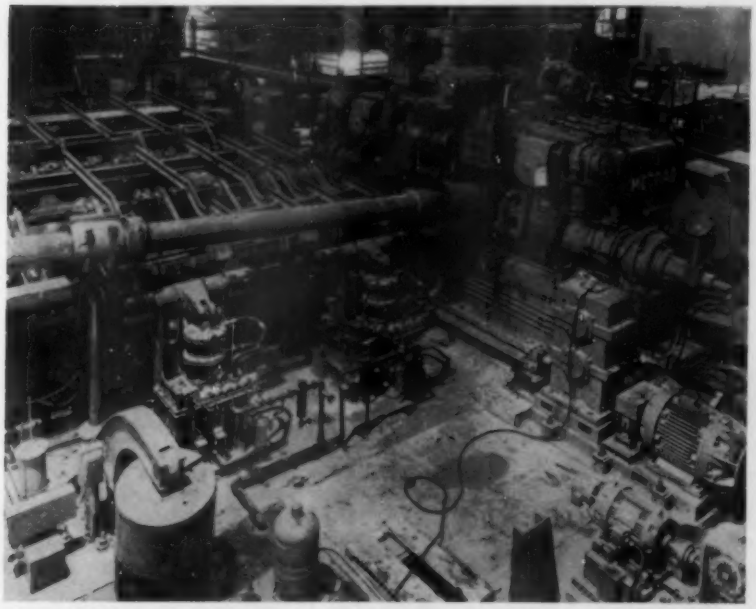
Here's the sequence:

. . . **In 1955, $7.35 a ton** more on basic steel with oil-country prices advancing from 5 to 15 per cent.

. . . **In 1956, $8.50 a ton** more on basic steel with oil-country prices up 6 to 9 per cent. In addition a 2 to 12 per cent price "correction" was made during the year on select oil-country items.

. . . **In 1957, a 3.5 per cent** adjustment, or about $7 a ton, was made in February on oil-country goods. This will be followed by the July increase in basic prices.

The end problably isn't in sight. Steel workers come up for another round of wage increases in the summer of 1958.



**MORE TUBULAR GOODS came on the market this month from Mannesmann Tube Co.'s new $20 million mill in Sault Ste. Marie, Ontario. It's Canada's first automatic seamless steel-pipe plant and is capable of producing 225,000 tons of 4½ to 10¾-in. seamless tubes each year. Shown above is plant's piercing mill.**

## Gasser Looks Good

### California producer taps two pay zones for big flow

SACRAMENTO. — California, which depends heavily on imported gas, has brought in one of its biggest gas wells since World War II.

General Petroleum Corp. finaled the 2 Sprague Lewis on the north edge of the Beehive Bend gas field in Glenn County, northwest of here.

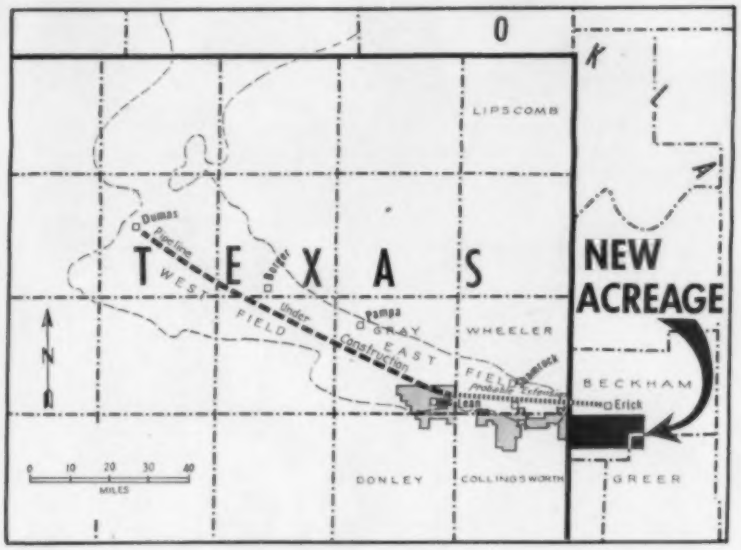
The well tested 36,000 M.c.f. daily from two zones. The upper pay, perforated at 5,090-5,340 ft., flowed 29,500 M.c.f. daily. The lower zone at 6,414-69 ft. tested 7,380 M.c.f. The big producer is shut in pending completion of a gathering system in that area.

While apparently the largest gas well in recent years, the 2 Sprague Lewis doesn't come near the records set by some California gas wells in the 1930's. The discovery wells of the Semitropic, Rio Vista, and Goleta gas fields initially flowed 107,000 M.c.f., 81,000 M.c.f., and 58,000 M.c.f., respectively.

There have been no large-scale gas discoveries in California since World War II *(The Oil and Gas Journal, May 27, page 100)*. The state's gas decline began about 1948. Since then, importation from other states has steadily increased. Today, more gas is imported than is produced in California.

# El Paso's Gas Campaign Is Biggest Yet

- 53,000 acres acquired from Phillips brings total block to 178,000 acres
- It's at least a 500-well program and will cost an estimated $50,000,000




DALLAS.—El Paso Natural Gas Co. plunged deeper last week into what likely is the biggest gas-development campaign ever carried out by a single company in the vast Panhandle area.

The pipeline giant has acquired another 53,000 acres of shallow Brown dolomite gas acreage, bringing its holdings in the Panhandle to 178,000 acres.

The new acreage, in Beckham County, Oklahoma, was obtained from Phillips Petroleum Co. at a cost of about $6,700,000. This swells El Paso's phenomenal cash outlay for Panhandle gas acreage to more than $40,000,000 in less than a year and a half.

Roughly 18 months ago the company paid $34,500,000 for gas rights to the base of the dolomite under 123,000 acres in Gray, Donley, Wheeler, and Collingsworth counties just west across the Texas state line from Beckham County.

The lands acquired in both deals are "reasonably proved" but sparsely developed. El Paso is expected to sink 500 wells, possibly more, in drilling up the acreage. This will run the bill up another $10,000,000 or so at present costs to a total of more than $50,000,000.

Then on top of this staggering sum, El Paso must dig deeper into its pocket for funds to lay gathering and trunk lines to carry the gas.

Obviously, the company expects to get its investment back and then some.

Prospects are that, when the drilling is finished, the company will emerge with a gas deliverability from these Panhandle holdings of between 300,000,000 and 500,000,000 cu. ft. of gas a day.

It likewise will have added to reserves tremendously—and removed itself from a Federal Power Commission hook. The FPC recently warned El Paso to do something about its reserves position. El Paso had been adding pipelines and markets faster than it has been adding reserves.

**The latest deal . . .** El Paso gets title to the big Beckham County block of gas rights via a swapout with Phillips Petroleum Co.

In return for the Oklahoma acreage it is assigning to Phillips part of its newly acquired interest in Venezuelan holdings.

El Paso owned a 23 per cent interest in costly 24,700-acre Block 10 in Lake Maracaibo and in remote wildcat concessions in La Grita, Seboruco, Garcia de Hevia, Rivas Berti, and San Juan de Colon municipalities in the State of Tachira. Phillips, one of its partners, held a 45 per cent interest.

Phillips gets an added 13 per cent interest from El Paso, giving it a controlling 58 per cent and slashing El Paso's to about 10 per cent.

The Block 10 acreage went to the group for a whopping $1,965-an-acre bonus or a total of $48,515,500.

El Paso's new gas rights in Beckham County extend down to the base of the Brown dolomite at 2,000 ft. Phillips had completed six wells in the block since 1951 with potentials averaging about 1,650,000 cu. ft. a day. The producers are widely scattered and virtually prove up the entire tract.

**Full speed ahead . . .** El Paso's drilling department already is busy with development plans for this block, while proceeding at a near crash pace to drill up the Texas acreage.

The company bought these holdings in two big spreads from Murmanill Corp., a Clint Murchison concern in Dallas, and three Amarillo independents—D. D. Harrington, Stanley Marsh, Jr., and T. J. Wagner, Jr.

El Paso's gas rights here also extend to the base of the Brown dolomite, with the sellers retaining all oil rights.

The acreage generally is at the extreme southeast end of the developed East Panhandle field production. One large block takes in southeast Gray County in the Alanreed-McLean area and the northeast corner of Donley County. The other is principally in northern Collingsworth County and extends from southeast of Lela all the way east across the county to the Oklahoma state line.

El Paso started only recently but already has drilled 25 or so producers on these blocks. It intends to punch down 75 or 80 this year, and perhaps even more than this next year. An agreement with the sellers commits the company to drill at least 300 wells here. The total likely will go considerably higher.

El Paso is reported well-fixed for materials to carry out a heavy drilling program.

The company has two light rigs drilling surface holes, followed by two heavier rotaries taking the holes on down. The rigs are using air as the drilling fluid and switching to gas on nearing the pay. Mud is kept available for emergency use.

Using these techniques, it is taking El Paso only 3 to 4 days on the average to drill and complete a Brown dolomite hole. The company cases the holes with 4½ or 5½-in. production string. Following fracture treat-

ment, the wells come in at rates up to 10,000,000 cu. ft. daily. The average potential, however, is closer to 3,000,000 a day.

Cost per completed well runs about $20,000.

El Paso hasn't said, but informed sources think the company will develop its Panhandle holdings on less than 640-acre spacing—either on 160 or 320 acres. This, on 176,000 acres, would make a lot of locations.

**Pipeline under way** . . . The company already is pushing construction of compressors and pipelines to handle the huge volume of low-pressure gas.

It has let contract to R. H. Fulton & Co., Lubbock, to lay about 100 miles of 18-in. line to connect the new supply to its existing trunk system at Dumas, Tex.

A Los Angeles contractor, C. F. Braun, is building an 8,100-hp. compressor station on the western terminus of the line about 20 miles west of Shamrock. A gathering system funneling into the station will be laid as soon as production climbs sufficiently.

El Paso officials say it is safe to assume that the 18-in. will be extended 40 miles or more to tap the newly acquired Beckham County holdings following more drilling there.

**Unusual twist** . . . An odd aspect of the El Paso venture is that such a huge program involving almost virgin acreage should develop smack up against one of the oldest major gas-producing areas in the world.

It's been known for a good many years that the Brown dolomite in the involved area would produce gas.

Why, then, hasn't one of the many big Panhandle pipelines jumped into this nearby source long ago?

There are several reasons:

. . . **Wells are small** as gas wells go. Many wouldn't have been economic some years ago. But the recent use of fracturing has hiked their output.

. . . **Pressures are low.** And horsepower needed to boost the gas up to required line pressure comes high.

. . . **Big acreage blocks** are hard to come by. Since this is an established producing area, acreage is virtually all leased and tightly held. And even with higher production from fracturing, big acreage is essential or such a venture still wouldn't be economic.

All in all, it appears that El Paso has stolen a march on its rival gas carriers—right in their own backyard.

***Subsidiary borrows parent's idea . . .***

# . . . Esso Operation Committee Passes Test

THE OPERATION committee of Esso Standard Oil Co. was just a year old when the anniversary picture above was taken earlier this month. The committee in its first year proved itself by handling a three-fold assignment to:

. . . **Work toward carrying out** company objectives established by the board of directors.

. . . **Bring about closer relationship** among departments.

. . . **Keep a careful eye on spending** to make sure a profitable return can be expected.

The committee was created by President Stanley C. Hope. It parallels to a large degree a similar committee of the parent company, Standard Oil Co. (N.J.). Its chairman is Glenn W. Poorman, a vice president and member of the Esso board. Robert H. Scholl, another vice president and director, is vice chairman. Members are department managers.

Weekly meetings are held at the New York headquarters, except when visits are made to field units.

Profits, costs, and use of capital are primary concerns of the committee. It examines budgets of all units before they are passed on to the board for approval. And before the committee recommends any capital outlay it gets assurances that the investment is justified in the company's over-all profit-loss picture. This job is part of Esso's philosophy that each unit must ultimately justify its own existence.

The field visits have produced double benefits:

. . . **First-hand knowledge** of field problems is picked up by management. Face-to-face meetings with employes has had an invigorating result of better relationships.

. . . **Improved coordination** among departments also has resulted. Everyone knows the other department's problem and is offering help.

LEFT TO RIGHT in photo: Noel M. Fillastre, executive assistant controller; James E. Stoveken, inland waterways general manager; E. B. Paust, general counsel; J. A. Miller, general manager of marketing; Robert H. Scholl, vice president and director; Glenn W. Poorman, vice president and director; B. J. Heiart, committee secretary; James N. Gorringe, employe-relations manager; J. Prince Warner, general manager of manufacturing; George T. Piercy, general manager, supply department; and Harold J. Rose, assistant general manager, chemical products department. John E. Wood, general manager of Chemical Products, and Frederick P. Hagaman, Esso controller, are also committee members. Rose and Fillastre are their alternates.

*Compact panelists debate a hot issue:*

HOCOTT

BUCKWALTER

MURPHY

BOSSLER

# Can Floods Be Prorated Without Loss?

**● One thing is certain: There's very little agreement on the answer. Hot dispute at Compact meeting puts pressure on committee for a finding by the end of 1957**

YELLOWSTONE PARK, Wyo.—Can water floods be prorated without loss of ultimate recovery?

This question, now seriously facing the regulatory bodies of several states, was the hottest topic of discussion at the summer meeting of the Interstate Oil Compact Commission. It drew a capacity crowd for an all-day symposium by reservoir engineers before the secondary-recovery and pressure-maintenance committee.

No conclusions were reached, but pressure is being put on the committee to make an engineering finding by the end of this year as a guide to policy action.

Only one speaker at the meeting took the position that a water flood can be curtailed without injury. He is Dr. C. R. Hocott, head of the production research division of Humble Oil & Refining Co. He reviewed and defended Humble's studies on this subject as published in detail in The Oil and Gas Journal May 13.

Four other scheduled papers and a dozen impromptu speakers took sharp issue with Hocott. Most of them professed to see little value in Humble's research work and contended that there is ample evidence that a water flood must be maintained at its maximum rate without interruption to get greatest oil recovery. A few, while disagreeing with Humble, think additional studies are needed.

**Background . . .** Water flooding has been increasing rapidly in recent years and now accounts for a considerable portion of total oil production. With one or two notable exceptions, state commissions have not attempted to subject water flood oil to proration. This has meant that other types of production have had to be severely curtailed to keep total output in line with market demand.

Recently the commissions of Texas, Oklahoma, and Kansas have been faced with requests to prorate water floods on the same basis as other production. More such requests are expected in the future. Flood operators say they cannot plan new floods nor operate existing projects economically if they are to be subject to proration.

This spring the Kansas Corporation Commission issued an order permitting a big increase in daily allowables of the Chitwood unit, but in doing so it laid down a policy for the future. It said it cannot allow water floods to take more than a fair share of the Kansas market, as this would deny the correlative rights of other producers and discourage development of new fields.

In the future the Kansas commission will hold a public hearing on each water flood application to determine its effect on the state's allowables. If it appears the effect will be significant, the commission may impose a maximum producing rate before the operation is begun.

**Humble's position . . .** Hocott said that a water flood has the same characteristics as a natural water drive. It has been demonstrated that a slow rate of production obtains the greatest ultimate recovery in a water-drive field. Therefore an artificial water drive will produce more oil if operated slowly and at low pressure.

All studies, indicating that a temporary shutdown of a water flood reduces ultimate recovery, are based on inadequate data and false assumptions, Hocott said. He criticized use of decline curves as not being applicable to water-flood conditions and said extrapolations of short-term results give erroneous figures on oil lost during a shutdown.

Finally, Hocott said that field studies are so inadequate that laboratory tests were used. Humble's core studies show that a water flood can be operated better at a slow rate and that oil will not be lost by a partial or temporary shutdown.

**The opposition . . .** Most of the other speakers jumped all over Hocott. Engineers whose methods he had challenged went into detailed rebuttals. The discussion got highly technical and at times acrimonious.

Scheduled papers on the other side were given by Bert Murphy, Water Flood Association, Inc., Fort Worth; Robert B. Bossler, professor of petroleum engineering, Texas A. & M. College; John Buckwalter, Ryder-Scott Co., Wichita Falls; and A. C. Simmons, Core Testing Laboratory, Bradford, Pa.

Chief points made by the defenders of the status quo were:

**. . . The preponderance of opinion,** based on existing literature, is that

water floods cannot be slowed down without loss. (Hocott's reply to this was that in Queen Isabella's court the preponderance of opinion was that the world was flat.)

**...Humble has no floods** and has an axe to grind in advocating proration of water-flood oil.

**...Regardless of technical questions** about extrapolations of log-log curves, there is overwhelming practical field experience to prove that oil lost during a water flood shutdown is never recovered.

**...The mechanism of natural water-drive** fields is entirely different from that of a closely spaced five-spot flood in a depleted sand.

**...The highest possible input pressure** that will not fracture the overburden will get out the most oil.

**...Continuous capacity operation** at the highest possible rate will yield the greatest ultimate recovery.

**A few doubters . . .** Some of the experts in the free-for-all discussion professed to an open mind on the subject.

They complimented Humble for its research contribution and agreed that more scientific study of water floods may be timely. They said that the experience in the Appalachian area may not be applicable to the giant flood projects in the Mid-Continent. Nobody fully agreed with Hocott, but a few conceded that he had made some points worth considering.

Buckwalter, for instance, said there is a great need for general agreement on a tool for measuring water flood results, to determine what is a good or bad flood, what is success or failure. He said there are so many variables that neither Humble nor Humble's opponents have a pat answer, so more studies should be made.

Somewhat of a maverick from both schools of thought was Jack Tarner, production engineer with Phillips Petroleum Co. He said he does not believe that any one factor is controlling in the efficiency of a flood. A flood can be engineered for maximum recovery with high or low pressure, fast or slow operation, close or wide well spacing.

In engineering a new flood, Tarner said, Phillips selects the combination of factors designed to get the most oil for the least money, whether in a short time or over a long period, and designs the plant accordingly. The design can be changed for fast or slow production, within limits, without affecting the cost per barrel recovered. But once a project has been designed and started, Tarner emphasized, the production rate cannot be changed without loss of ultimate recovery.

The policy of state regulatory bodies, Tarner suggested, should be to set a water-flood producing allowable before work is started.

If the state foresees excess oil for several years, the flood could be designed to produce slowly over a long period without economic or physical loss. But once the commission sets the producing rate it should not tamper with it during the life of the project.

While the engineers continued to argue over the construction of log-log curves and extrapolation of parameters, most operators in the audience seemed to agree that Tarner's suggestion for commission policy was a practical one that they could live under.

**CONSTRUCTION CREWS bury 30-in. pipeline in burning Mohave Desert as . . .**

# Gas Line Nears Completion

LOS ANGELES.—Two spreads are rushing completion of Southern California Gas Co. and Southern Counties Gas Co.'s 241-mile natural-gas pipeline between Topock, Ariz., and Newhall, Calif.

One spread is working westward toward Victorville 35 miles from Newhall, and the other is working in Mint Canyon approaching the Newhall terminus. The 30-in. line will probably start feeding gas to the Los Angeles area late this month or early in July. R. H. Fulton & Co. of Texas has the contract.

The crews are trying to beat the summer heat as well as the contract deadline. During the first week in June, temperatures on the Mojave Desert where crews are working were 140° F. in the sun, and 115°-120° in the shade.

At Newhall, the line will connect with a 49-mile segment completed last year between Newhall and Alhambra in metropolitan Los Angeles. The entire 285-mile carrier will cost $33,500,000 and will have an initial capacity of 278,200 M.c.f. daily. El Paso Natural Gas Co. will supply the new line.

The desert portion of the pipeline includes two large suspension bridges: One is a 650-ft. bridge spanning the Santa Clara River, and the other is a 400-ft. span over the Mojave River. A suspension bridge across the Colorado River at Topock is being built by El Paso Natural.

The two utilities recently awarded contracts for a $3,387,000 compressor station on the Arizona-California border near Needles. Initial capacity of the station will be 227,600 M.c.f., provided by four 2,000-hp. compressors. Completion is scheduled late this year.

# Pipeline Probe Hatched

## O'Mahoney previews investigation report: It may spell a bad time next year for big, international oil firms

WASHINGTON.—Sen. Joseph C. O'Mahoney of Wyoming gave a preview last week of what the report on his probe of the European oil lift may say. It was all bad for the integrated and international oil companies.

If O'Mahoney's joint subcommittee accepts all the recommendations of his staff, the companies are in for trouble next year in Congress and the courts.

One staff idea seems almost certain to be included in the report, not yet written. It calls on the Justice Department to make an immediate investigation of oil-company ownership of pipelines.

What started out last February as a study of Europe's oil supply after the closing of the Suez Canal quickly developed into an all-embracing probe of the top oil companies. Already eight fields have been carved out for discussion in the report:

... **Effect of imports** on development of the domestic oil industry.

... **Major-company** control over transportation.

... **Effort to build** a West Texas-California pipeline.

... **Depletion allowance** on foreign production.

... **Competitive implications** of joint ownership in the oil industry.

... **Arabian American Oil Co.'s** profit-sharing arrangement with Saudi Arabia.

... **The "oil monopoly" pricing** pattern for crude oil and price leadership in sale of products.

... **Advantages of major,** integrated companies over independent producers and refiners.

Not all of these fields were fully investigated during last winter's hearings. O'Mahoney hinted of new hearings in the future "in the light of the testimony" then presented.

**Unusual method . . .** O'Mahoney adopted a new and unique way of getting his story before the public.

He held an open meeting at which the staff read its reports and recommendations. These usually are held confidential for use by committees in writing reports.

But O'Mahoney explained that he is concerned about the power of management rather than Government in the economic field.

"We have reached the point," he said, "where we must decide whether we want antitrust laws or Government by management. And the growth of the international companies raises the danger of importing the cartel system which has destroyed Europe."

SENATOR O'MAHONEY
. . . His preview tough on oil

The oil industry has been far more successful than any other in getting preferential treatment from the Government, it was charged by Donald P. McHugh, subcommittee counsel, in his report. It has secured numerous grants of antitrust immunity. It has had "vigorous and active champions in high positions in Government." In particular, it has been successful in the State Department in shaping policies by which it benefitted.

The European oil lift also came in for criticism. There was doubtful legal authority for the formation of the Middle East Emergency Committee, the staff charged. The government agencies failed to require strict antitrust safeguards for the plan of action. Sufficient attention was not given to alternative methods involving no conflict of interest and no antitrust immunity.

High tanker rates and the increase in crude prices last January made for big profits from the European oil lift, the staff reported. And the government agencies failed to exert their influence to forestall the price increase.

The operations of Aramco, its relations with Saudi Arabia, and its domestic tax status were explored intensively during the hearings. The staff recommended a law requiring the registration of foreign contracts with a government agency. It also suggested the possibility of withholding the depletion allowance on foreign production.

**Trend decried . . .** McHugh disclosed that 42 antitrust actions have been brought against oil companies since the Sherman Act was passed in 1890. Nineteen of them involved companies who were members of the M.E.E.C.

"The trend in operations in the domestic petroleum industry from a free, competitive status to a series of planned, cooperative or joint programs of a cartelized nature is alarming," McHugh said.

The subcommittee now is awaiting a report from Victor R. Hansen, chief of the Justice Department's antitrust division, on charges that the M.E.E.C. companies took joint action to reroute pipeline shipments before the issuance of Schedule 4 by the Interior Department and without antitrust immunity.

"The dangerous tendency toward joint enterprises in the oil industry and the alarming record of cooperative action with antitrust immunity highlights the danger of cartelization in the United States," McHugh reported.

"It should be sufficient warning that future emergency programs cannot be turned over to private industry if long range competitive goals are to be observed, particularly in the oil industry where international policy considerations are so closely interwoven with industry operations."

**Give Congress say . . .** McHugh recommended that the granting of antitrust immunity be taken from the Justice Department and lodged solely in Congress.

There are two situations now in which a waiver of the antitrust laws may be sought, he said. In each case the public policy involved is too vital to be left to the discretion of the attorney general.

McHugh had in mind the President's order to Mobilization Director Gordon Gray to work out some type of voluntary agreement on imports. It is not clear how such a plan would work, he said, but he predicted that if the importing companies went into one they would want an antitrust waiver.

The other case involves building a new big-inch Middle East pipeline. Five American and three foreign companies will be involved. The plan "is

fraught with antitrust dangers," McHugh declared.

"This proposed pipeline graphically illustrates the influence and effect of oil company operations upon the peace and security of the world," the subcommittee was told. "It is to be regretted that necessary exploratory talks have been left entirely in the hands of the private oil companies without the guidance and official responsibility of the United States. It would also seem incumbent upon the State Department and other government agencies having a direct interest in the problem to keep Congress fully advised of the developments and to outline the possible alternative courses of action."

McHugh warned that the Government should get into the deal now. If it waits until the plan is perfected by the companies, there will be great pressures for its approval and a grant of antitrust immunity.

**Du Pont case . . .** The recent Supreme Court decision that Du Pont exercised undesirable control over General Motors through its ownership of 23 per cent of the latter's stock has "opened new vistas of antitrust enforcement" which may be used against the pipelines, McHugh said.

"It would seem that much more potential danger to competition (than in the Du Pont case) exists in the case of 100 per cent ownership or control by major oil companies over pipelines where such control has been used to deny independent producers access to markets."

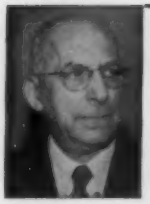
## *Competitors' Gas So Cheap, Texan Buys It*

HOUSTON. — A neighborhood price war in the northwest section of Houston has forced the price of regular gasoline as low as 17.4 cents per gallon.

One enterprising service-station operator, attempting to cash in on his competitors' woes, sent his 4,600-gal. tank truck to fill 'er up at competing stations.

He bought a major-brand gasoline at 17.4 cents a gallon from one station, but this purchase was limited to 20 gal. At another station he succeeded in buying 800 gal. at 17.9 cents a gallon.

The purchaser was selling regular for 21.9 cents a gallon at his station, located down the street a few blocks.



## watching WASHINGTON

. . . with Bertram F. Linz

### Wanted by Ike: Good men for oil study

PRESIDENT EISENHOWER is having a difficult time getting the kind of men he wants to make a study of oil imports.

Mobilization Director Gray reported some 7 weeks ago that he considered imports a threat to national security. Eisenhower said at once he would order an inquiry. But so far no steps have been taken to get the inquiry started.

There's good reason, of course, why the President is finding it hard to set up a panel. The idea of official limits on imports runs counter to State Department policies aimed at easing tensions in world trade. And quotas might have a bad effect on our diplomatic relations with foreign oil-producing countries.

Eisenhower has said he hopes some plan may be worked out for the companies themselves to keep a lid on imports. Gray again is probing the possibilities. But the opening on the East Coast of still more refineries geared to Middle East oil doesn't improve his chances of success.

Congress, meanwhile, is keeping steady pressure on the White House for quick action. Almost weekly, congressmen talk with Eisenhower. They urge him to do something about foreign oil. They say imports show signs of getting entirely out of hand.

### Shorter week: An answer to automation?

HOW is automation going to affect workers throughout the world? This big question is before the International Labor Organization now meeting in Geneva.

Government, employer, and worker delegates from 77 nations are assaying a report by David A. Morse, director-general of the ILO, covering every angle of what suddenly has become the big subject of concern in labor circles.

Morse, in brief, holds that automation will give impetus to higher labor and living standards. This will be especially true in the less advanced countries.

Automation, Morse says, need not create over-all unemployment. But he warns that it may create some short-term problems of relocation of labor that may make trouble.

The difficulties of robot operation will be less severe in the U. S. than abroad. The oil, chemical, automobile, and other industries already are well along the path of automation. But even here labor leaders have shown concern about its effects. Their first move to counter these is a campaign already under way toward a shorter work week.

### Friendships are regulated too

CONGRESS is warning regulatory agencies not to become too friendly with the companies they control.

A House subcommittee last week advised the Federal Power Commission and other agencies to adopt a "code of ethics." Among other things, the code should bar informal meetings with officials of regulated companies. The subcommittee said these sessions have become a practice.

The subcommittee's criticisms about regulation of industry weren't aimed directly at the FPC. But the problem of where to draw the line separating the regulating commission and the business being regulated is faced by all the agencies.

The FPC, however, is expected to be brought into a study of all federal regulatory agencies now starting. This probe will be separate from and much broader than one which the House commerce committee plans to make of the agencies under its control. The FPC also is included in that group.

Neither inquiry is expected to reach the hearing stage this year.

## Unitized Oil Fields in the United States

December 31, 1956

| State— | No. of projects | 1956* production barrels | Estimated original liquids in place (thousands of bbl.) | Estimated Ultimate Recovery—Without unit—Thousands of barrels | Estimated Ultimate Recovery—Without unit—Per cent original in place | Estimated Ultimate Recovery—With unit—Thousands of barrels | Estimated Ultimate Recovery—With unit—Per cent original in place |
|---|---|---|---|---|---|---|---|
| Arkansas | 12 | 11,124,882 | 734,387 | 311,081 | 42.4 | 413,586 | 56.3 |
| California | 18 | 53,323,000 | 5,257,537 | 1,231,758 | 23.4 | 2,126,185 | 40.4 |
| Colorado | 3 | 6,189,614 | 197,841 | 61,633 | 31.2 | 90,618 | 45.8 |
| Illinois | 54 | 11,584,705 | 1,202,088 | 340,920 | 28.4 | 633,059 | 52.7 |
| Indiana | 19 | 1,624,400 | 53,507 | 10,253 | 19.2 | 24,011 | 44.9 |
| Kansas | 31 | 5,319,518 | 420,962 | 86,220 | 20.5 | 165,419 | 39.3 |
| Kentucky | 6 | 458,800 | 22,405 | 3,735 | 16.7 | 10,775 | 48.1 |
| Louisiana | 91 | 37,907,491 | 1,404,349 | 565,740 | 40.3 | 769,530 | 54.8 |
| Michigan | 4 | 1,146,968 | 66,700 | 15,197 | 22.8 | 22,296 | 33.4 |
| Mississippi | 2 | 3,726,625 | 430,000 | 103,043 | 24.0 | 175,000 | 40.7 |
| Montana | 1 | 34,517 | 6,800 | 2,360 | 34.7 | 2,600 | 38.2 |
| New Mexico | 1 | 13,384 | 8,750 | 1,250 | 14.3 | 2,250 | 25.7 |
| Oklahoma | 48 | 25,842,828 | 2,759,194 | 605,357 | 21.9 | 998,672 | 36.2 |
| Texas | 101 | 111,344,113 | 9,668,258 | 2,527,148 | 26.1 | 4,409,871 | 45.6 |
| Wyoming | 13 | 32,836,760 | 3,858,700 | 859,500 | 22.3 | 1,334,100 | 34.6 |
| Total | 404 | 302,477,605 | 26,091,478 | 6,725,195 | 25.8 | 11,177,972 | 42.8 |

*Total liquid hydrocarbons.

# Why Unitization Is Growing So Fast

YELLOWSTONE PARK, Wyo.—Unitization is growing more potent by the year as a prime means of hiking U. S. oil recovery.

A report filed with the engineering committee of the Interstate Oil Compact Commission here last week shows that there were 404 unitized conservation projects operating at the first of the year.

And they accounted in 1956 for for 302,477,605 bbl. or roughly 11.5 per cent of the total U.S. oil production during the year.

The report was compiled by Core Laboratories, Inc., Dallas petroleum-engineering service firm. It was presented at the meeting by W. L. Horner, vice president and head of the Core Lab engineering and consulting department.

The report also reveals that unitized production makes up about three-fourths of the production of all secondary-recovery and pressure-maintenance operations. Salt-water disposal projects were excluded.

The Core Lab study found that the 404 units originally contained about 26 billion barrels of crude oil. It reported 6.7 billion barrels recoverable without unitization, compared to an estimated 11.2 billion barrels with unit operation. This is equal to recovery percentages of 25.8 and 42.8 per cent, respectively.

**Gaining fast . . .** Unit gains show clearer when you look a few years back. The number of units has quadrupled since the committee heard a report on the subject in 1952.

There were about 100 then. In the past 4 years more than 300 new projects with 18.1 billion barrels of oil in place were formed. About 95 projects were added during 1955 and 1956.

The survey found that 324 units took in entire fields. The remaining 78 were operating in fields where other production wasn't unitized.

An estimated 44.1 per cent of the oil in place will be recovered from the fully unitized fields, compared to 38.9 per cent for the partially unitized ones.

**Figures conservative . . .** The report's totals, according to Horner, are conservative.

He pointed out that the two largest projects in Arkansas (those in Midway and Magnolia) were unitized in 1956 after several years' of successful operation as cooperative water-injection programs. Unitization assured the ability of these programs to continue. Most of the production gains, however, are not included in the estimates for unitized projects.

Higher ultimate recovery is coming, too, from new recovery methods such as miscible-phase displacement and underground combustion, Horner said. He estimated that these methods where feasible will recover from 70 to 90 per cent of oil initially in place. Such projects will net more oil from present units and encourage the formation of new ones.

The study also refuted evidence that unitization results in lower yearly production in favor of output stretch-out over more years.

Projects in Arkansas, California, Louisiana, Oklahoma, and Texas were reviewed in this light. Total output of the projects the year prior to unitization was 238,994,884 bbl. During the year of unitization, it climbed to 247,602,078 bbl. and further to 248,-723,171 bbl. the year after unitization.

By far the biggest Texas unit, SACROC in Kelly-Snyder field, obtained a production hike from the Texas Railroad Commission of over one-third August 1, 1956, Horner said. And the huge Goldsmith San Andres unit was granted a 60 per cent gain in daily output the same day.

The report also lists a spectacular gain in Block 31 Devonian unit in Crane County, Texas. There, when unitized in 1948, production totaled 1,300,000 bbl. It climbed to 2,000,-000 bbl. in 1950 and in 1956 was

producing at a 5,700,000 bbl. yearly rate.

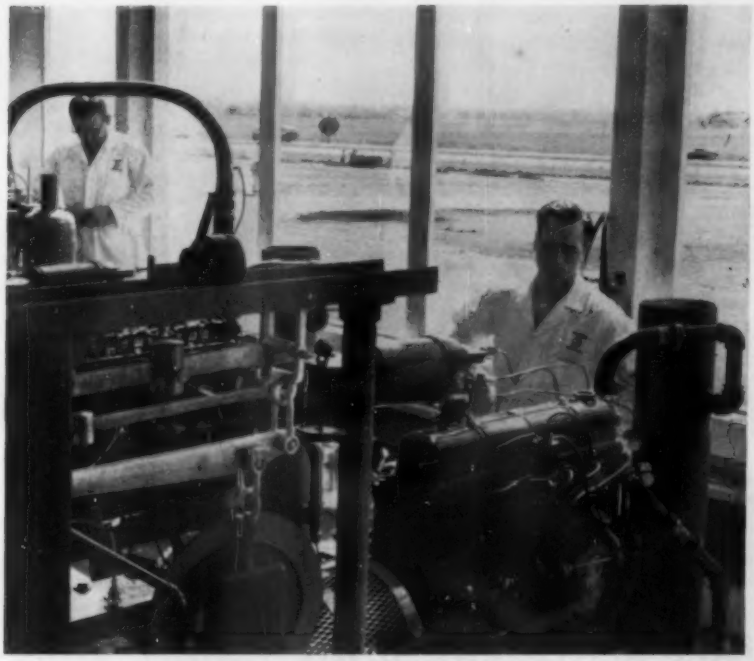
The steady hike, Horner said, was in recognition of pressure maintenance by high-pressure gas injection. It came about despite a steady decline in the average monthly producing days allowed in Texas.

These, Horner said, averaged 18.7 days in 1952; 17.8 days in 1953; 16.2 days in 1954 and 1955; and about 15.8 days in 1956.

**Texas leads . . .** Texas topped all other states in 1956 in unit numbers and production. Last year 101 Texas units produced 111,344,113 bbl. of oil.

Louisiana had the next largest number of units with 91, followed in order by Illinois with 54, Oklahoma with 48, and Kansas with 31.

California ranked second as to unit production with 53,323,000 bbl., followed by Louisiana with 37,907,491, Wyoming with 32,836,760, Oklahoma with 25,842,828, and Illinois with 11,584,705 bbl.



**PRODUCT RESEARCH gets the emphasis here as . . .**

## Cities Service Lab Boasts A Hot Cell

CRANBURY, N. J.—This newest and largest of Cities Service Oil Co.'s five research laboratories was formally opened last week. Located in the heart of the nation's greatest marketing area and adjacent to the New Jersey Turnpike, the Cranbury unit is devoted to product research.

The lab boasts a nuclear unit where 3 lbs. of radioactive cobalt 60 is housed in a hot cell. The cobalt-60 source has a strength of 5,400 curies, most powerful ever sent out from Brookhaven national laboratory in a single shipment.

This cell is equipped with the conventional shielding, master-slave manipulator, and a 42-in. thick safety glass window. The gamma-ray source comprises six half-pound cobalt rods sheathed in stainless steel. It will be used in studying the possible application of radiation in processing, and the effects of radiation on products.

Fuel testing is carried out in a fully equipped laboratory for evaluating the properties of motor fuel, avgas, jet fuel, diesel fuel, and heating oils.

The lubricants division is responsible for laboratory and field testing of oils, greases, or synthetic lubricants. Backing up this product research is an analytical division. Its work falls into four parts: physical testing, machine testing, chemical analysis, and instrumental analysis.

The new products lab rounds out Cities Service's research effort which also includes laboratories in refining research at Lake Charles and East Chicago, production research at Tulsa, and product testing at Hillside, N. J.

## —— *Industry* briefs

**Trans-Canada Pipe Lines, Ltd., has** increased the price of Alberta natural gas 2 cents, according to reports from major gas producers. Trans-Canada officials would not confirm the reports, but producers said the new price—12 cents per M.c.f.—is contained in new contracts.

This means that Trans-Canada will pay 16 cents per M.c.f.—12 cents to the producers and 4 cents to Alberta Gas Trunk Line Co., Ltd., for gathering and transporting the gas to the Alberta-Saskatchewan border. Increased demand for Alberta gas in eastern Canada and the U. S. was cited as reason for the increase.

**Full-scale summer drilling activity** has resumed in Alberta and Saskatchewan following the lifting of most road bans. Last week there were 237 drilling rigs working in Alberta, 75 in Saskatchewan, 16 in British Columbia, and 13 in Manitoba.

**Zephyr Drilling Corp. of Tulsa and** Joseph L. O'Neill Jr., Midland independent, have purchased the principal interest in Williamson Well Equipment Co. of Odessa, Tex. Firm will be reorganized into Williamson Well Service, Inc., with J. C. Williamson as chairman. New president will be J. R. Yost, a vice president of Zephyr, who will move to West Texas.

**Cuban Stanolind Oil Co. has made** application for uranium concessions on 25,000 acres in Camaguey Province, Cuba. Cuban Stanolind has conducted preliminary studies of the area but has made no detailed search for ore. Cuban-Venezuelan Oil Voting Trust and Trans-Cuba Oil Co. each have a 25 per cent interest in the proposed concessions.

**Natural Gas Storage Co. of Illinois** is building a compressor station and meter station at Cooks Mills, Ill. Construction contract was awarded to Refinery Engineering Co. of Tulsa, a division of Vitro Corp. of America. The two units, about 40 miles southeast of Decatur, Ill., will be completed in September.

**Sunset International Petroleum** Corp. and Eagle Oil & Refining Co., Inc., have jointly purchased 18 wells from Trigood Oil Co. of Casper, Wyo. The properties include eight wells in Raisen City field, seven in Midway-Sunset field, and three shut-in wells in Helm field. Total production is 525 bbl. daily.

# Gas Bill Gets New Life

## Senate probably now holds fate of measure as President clears way for House action by junking hated amendments

WASHINGTON. — The President has injected new life into the Harris-O'Hara gas bill. Whether this will give the bill enough zip to clear both houses before adjournment, however, is still doubtful.

Senate action now appears the big hurdle even if the bill can clear the House.

Congress has set its sight on adjourning within 2 months. Chairman Warren Magnuson of Washington said last month his Senate commerce committee would not take up the Harris bill this year even if the House passed it. The time needed for hearings and a possible filibuster on the Senate floor would work against it, he said.

**Eisenhower's role . . .** President Eisenhower told Rep. Oren Harris of Arkansas last week he wants Congress to pass a gas bill.

Eisenhower wants the bill this year. And to get it he is willing to drop the so-called administration amendments.

Two changes in the bill were laid before the House commerce committee last month by Charles Kendall, general counsel of the Office of Defense Mobilization. One called for striking the ban on use of cost by the Federal Power Commission as a factor in reaching reasonable market price. The other would have granted the FPC authority to reopen existing contracts with fixed-escalation clauses.

These changes were of "possible desirability," the President told Harris. But he left it up to Congress to pass on them.

This latest statement by Eisenhower removes one of the major roadblocks to passage of the bill by the House this year. It is strong enough to meet the desire of Democratic leaders for definite word on the President's stand before they got behind the Harris bill.

**House may move . . .** The House group now is expected to get down quickly to the job of preparing the bill for floor action.

Several issues remain to be settled within the committee, however. These include controls on direct and "dump" sales of gas by pipelines. Also involved is a plan to keep larger gas producers under FPC control while exempting the smaller ones.

The committee may hold its first meeting on the bill this week. It may send the measure to the House floor by the end of the month. The outlook is that the bill will be voted out of committee by only a small margin despite new support from the White House.

Once the bill is voted out, it must pass the hurdle of the House rules committee. This group decides what bills shall come before the House and how much time shall be allowed for debate. It is the most powerful committee of the House, and there are a number of members on it who would like to keep the gas bill bottled up.

If a fight develops within the rules committee, House leadership will be asked to bring pressure to blast the bill out.

**What Eisenhower said . . .** Eisenhower's latest statement on the bill was made in response to an inquiry by Harris, who asked how firmly the administration felt about its demands for changes.

"As I have repeatedly stated, I favor legislation freeing producers of natural gas from utility-type regulation," the President wrote.

"The amendments referred to were offered as of possible desirability, but do not represent my fixed conclusions. Your committee will doubtless wish to consider them with this thought in mind."

But whether the changes are adopted, Eisenhower declared, "I wish to reemphasize the importance of enacting natural-gas legislation at this session of Congress."

Harris disclosed that his inquiry to the President was based on doubt as to the effect of the changes as explained by Kendall.

"I asked the President if the amendments were submitted merely as suggestions for the consideration of the committee or whether he regarded the amendments as necessary in view of the questions raised and the doubt as to their advisability or desirability," Harris explained.

Harris personally felt the changes would "be unwise, undesirable and unnecessary," he said. They would raise many problems, would not be in keeping with the bill, and would result in ambiguity.

"Since they do not represent the 'fixed conclusions' of the President, I must consider that he also does not regard them as necessary," Harris said. "As he 'reemphasized' the importance of enacting natural-gas legislation at this session of Congress, I think from his reply he wants the bill without the amendments."

# McCarthy Holdings Being Sold

HOUSTON.—Properties once held by McCarthy Oil & Gas Corp. are being sold to Houston Natural Gas Corp. for approximately $7,000,000.

John H. Wimberly, Houston Natural president, said the company has reached an agreement for purchase of the properties from Equitable Life Assurance Society of the United States. The transaction is scheduled to be completed by July 31.

Included in the sale is Equitable's net interest in some 17,000 acres, of which about 10,000 acres has oil or gas production. Most of the property is in Jefferson County, Texas. It includes large oil and gas reserves in Big Hill and Stowell fields.

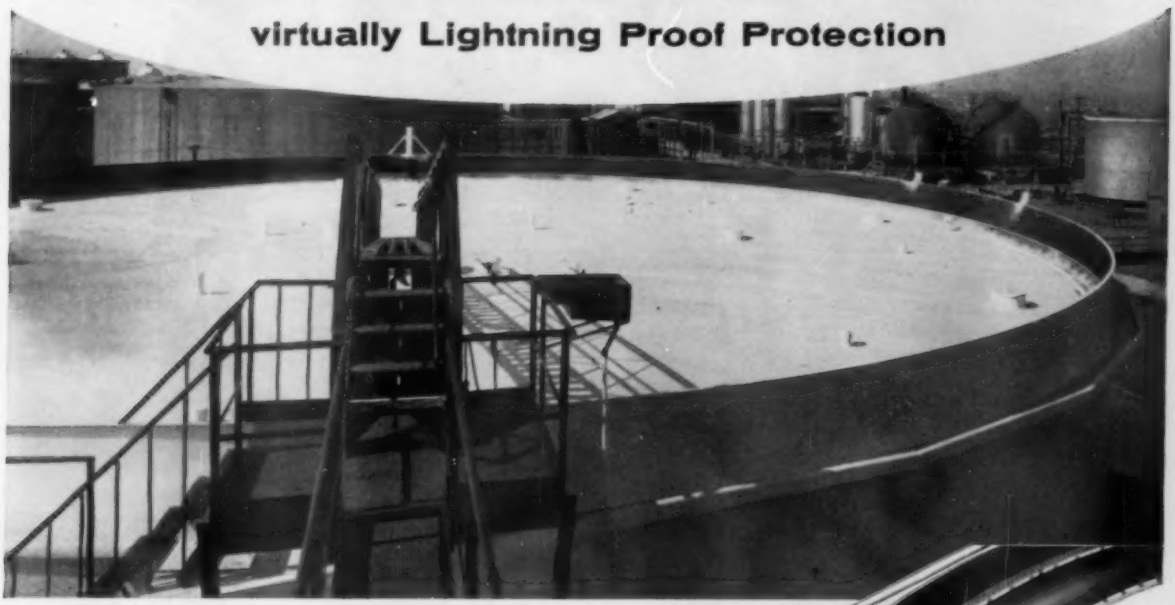
Equitable gained control of the property in 1952 when Glenn McCarthy, Houston wildcatter and former owner of McCarthy Oil & Gas Corp., defaulted on a large loan from the insurance company.

The Houston utility company greatly expanded its holdings in 1956 through purchase of Houston Pipe Line Corp. This transaction involved 761 miles of gas-transmission lines and 408 miles of gathering lines.

McCarthy, attempting a comeback in his stormy oil career, is rumored to be seeking drilling rights in Central America. He recently signed a contract to turn over his rights to a Bolivian oil concession to Tennessee Gas Transmission Co., Union Oil & Gas Corp. of Louisiana, Lion Oil Division of Monsanto Chemical Co., and Murphy Corp.

The contract is contingent on the exercise of an option from the Bolivian Government by which the four companies could take over the McCarthy concession. If the option is exercised, the four-company group would pay McCarthy $1,500,000 in cash plus an additional $1,500,000 in production payments if commercial production is established.

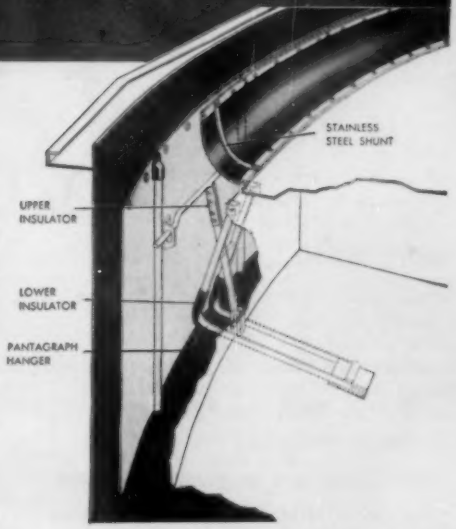
# NEW Insulated Pantagraph Hangers available with HORTON FLOATING ROOFS provide virtually Lightning Proof Protection



A new pantagraph hanger, designed by CB&I for use with the Horton® Seal, has a large number of shunts spaced equally around the roof above the seal fabric. The underseal hangers are insulated so that the current induced by lightning must pass through the shunts. This eliminates the possibility of sparks in the rim space. Ignition cannot occur when lightning strikes on or near the tank.

*All* floating roofs have a rim space which may contain a flammable mixture. The important thing is to avoid a source of ignition in the vapor space. The new CB&I design of shunts and insulators eliminates the possibility of ignition by lightning-induced sparks. Now you can have lightning protection in addition to proven safety from exposure fires.

Horton Seals equipped with CB&I's new insulated pantagraph hangers are available on Horton Double-Deck, Pontoon and Pan Floating Roofs. Complete information, estimates or quotations may be obtained by writing our nearest office.




Cutaway view of a Horton Seal with new insulated pantagraph hanger designed to provide virtually lightning proof protection. Insulation on underseal hangers prevent lightning induced currents from passing through them and large area stainless steel shunts carry currents from the floating roof across the fabric and to the tank shell.

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*Congrats and $25.00 to
T. R. EMBACH, Pure Oil Company,
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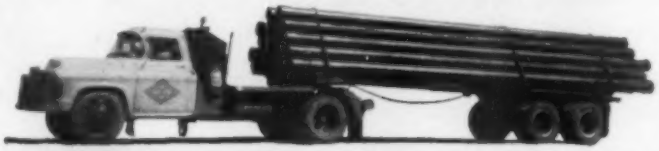
**Neighbor, wherever you are, specify Lone Star and we both get a good deal.**



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# New Strikes Raise Hopes

OUTLOOK, Mont. — Three new pool discoveries in Sheridan County may trigger a big development program on Amerada Petroleum Corp.'s 120,000-acre block in northeastern Montana.

Amerada's newest discovery—the 1 Ruegsegger—came in for 293 bbl. of oil from Silurian perforations at 9,067-71 ft.

The Ruegsegger is just 2 miles northwest of Amerada's 1 Tange, which opened Outlook field late last year, flowing 2,742 bbl. of oil daily from the Silurian. This well had a potential bigger than any previous Williston basin discovery.

Two weeks ago, Amerada completed the 1 Loucks, 4 miles southwest of the Tange. It flowed 312 bbl. of oil daily from the Ordovician-Red River.

The three are significant because:

**...The geologic age** in all three is pre-Mississippian. Nearly all other Williston basin production is from the Mississippian section in Montana and North Dakota, as well as southeastern Saskatchewan.

Nearest Silurian production in Montana is about 90 miles south-southwest of the new area. North Dakota has no Silurian production at this time, although the first oil ever to flow in that state came from the Silurian, and recent deep tests in North Dakota have had good shows in the rocks of that age.

**...Geographically,** Outlook is the center of huge blocks of sparsely drilled acreage. Nearest production is 29 miles southwest of Outlook in the Northeast Bredette field.

Amerada holds 120,000 acres around Outlook and is currently drilling two more pre-Mississippian tests. The 1 West, a northwest extension to Outlook field, is drilling below 6,300 ft. And the 1 Grant, 10 miles northwest of Outlook is below 9,200 ft. What these two wells do will probably determine the extent of Amerada's development program in northeast Montana, officials said.

Another pre-Mississippian test has been staked 30 miles southeast of the Outlook field, where The Texas Co. plans to go to 10,500 ft. at its 1 Brekke.

Outlook field is about 80 miles northwest of the Tioga area in North Dakota, where Amerada opened the Williston basin in 1951 after other companies had written it off.

Amerada's Montana campaign had been disappointing before the Outlook break. The new discoveries may mean the tide has turned for Amerada in Montana.

***California senate acts:***

# Long Beach Flood Approved

LONG BEACH, Calif.—The way has been cleared for a huge water flood in the Long Beach Harbor area of Wilmington field. It has the dual purpose for checking land subsidence and increasing oil recovery.

The bill enabling Long Beach to pool city properties with those of offsetting oil companies was approved by the California Senate last week. The assembly already had approved the measure and Gov. Goodwin Knight has indicated he will sign it.

How soon large quantities of ocean brine will be going underground depends on several factors. The most important question is: How quickly can the city and oil companies get together on detailed plans for the cooperative effort?

Time is important from the subsidence viewpoint. Primarily because of oil-producing activities, portions of the harbor area have dropped as much as 23 ft., and the ground is still sinking at rates up to 1.4 ft. per year.

None of the lost ground can be regained by pressure maintenance. But if allowed to continue unchanged the epicenter may drop as much as 12 ft. more. Portions of downtown Long Beach may sink several feet.

**Pilots under way . . .** Currently 30,000 bbl. of ocean water is being injected in five pilot floods. Their effect in checking subsidence can't be determined, but they have indicated the feasibility of flooding for secondary recovery.

Long Beach Development Co., contract operator for most of the city's harbor oil properties, has plans for stepping up its water-injection rate to 180,000 bbl. daily.

This project would be confined to the south flank of the anticlinal structure. Some water would go into the shallow Tar Zone in Fault Block 3, but most would go into the Ranger and Terminal zones in Block 5.

The firm is hoping to get the project under way soon, since its contract expires in 1964. But even so it would take more than a year to increase the rate to 150,000 bbl. daily. The 180,000-bbl. rate couldn't be reached before sometime in 1959.

**Cooperative agreement . . .** Injection of much larger amounts of brine can't be started until the city enters into cooperative agreement with four neighboring operators. These are Union Pacific Railroad Co., General Petroleum Corp., Richfield Oil Corp., and Phillips Petroleum Co. When operating or unitization agreements are reached with these companies, injection then can be expanded to North Flank zones in Block 4.

Studies sponsored by Richfield have estimated a flood of 1,000,000 bbl. daily will be necessary to effectively halt subsidence. Even then 3 years of injection would be required to fill voids by fluid and gas withdrawals.

## Alberta to Get Sulfur Plant

CALGARY.—Shell Oil Co., Texas Gulf Sulfur Co., Inc., and Devon-Palmer Oils, Ltd., will build a 300-ton sulfur plant in the Okotoks gas area 12 miles southeast of here. Plans for the new extraction plant were announced following unitization of natural-gas rights in the area.

Shell discovered the field in 1950 and has drilled eight gas wells in the D-1 zone of the Devonian. Devon-Palmer will handle field operations, and Texas Gulf will operate the plant. The 15,000 M.c.f. of residue gas will go to the Calgary market.

This will be the second such plant for the Calgary area. Jefferson Lake Sulfur Co. will build a 300-ton plant on a Mobil Oil of Canada, Ltd., farmout east of here—19 miles north of the proven limits of the Okotoks field.

Jefferson Lake is now drilling its first pair of wells to develop the plant's gas supply. D-1 Devonian gas in this area has a sulfur content of 12 tons per million cubic feet of gas.

# C.A.T.C. Balks at Sale

## Group tells FPC it refuses to sell its offshore gas in interstate commerce unless firm price fixed in advance

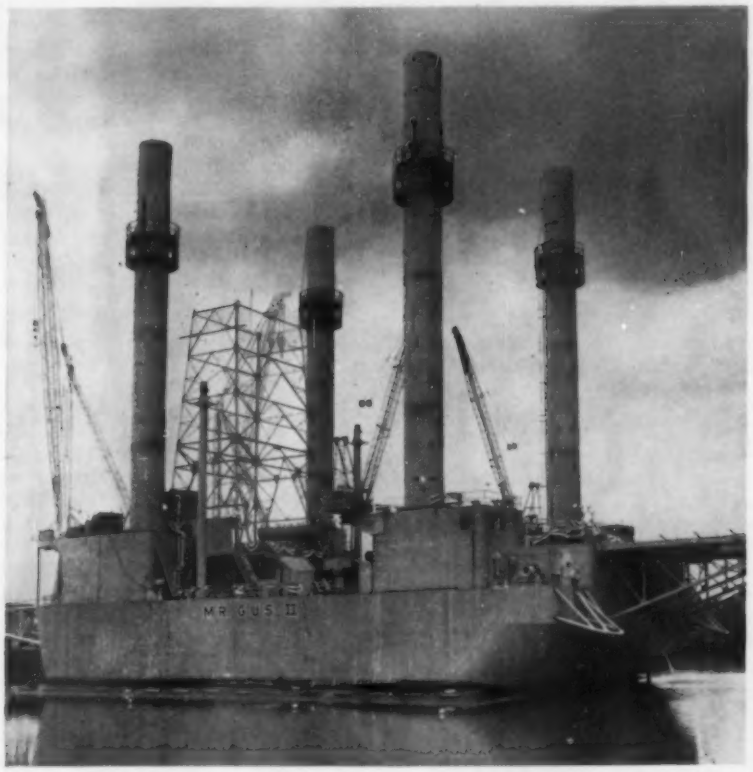
WASHINGTON. — Continental Shelf gas producers will not sell for interstate commerce unless a firm price is fixed in advance. Lower-than-contract prices with a vague promise of an increase later just won't do.

That, in effect, was the ultimatum tossed the Federal Power Commission last week by attorneys for the four companies known as the C.A.T.C. Group.

Hanging on FPC action is a billion-dollar contract under which Continental Oil Co., Tidewater Oil Co., Atlantic Refining Co., and Cities Service Production Co. would sell more than 6 trillion cubic feet of gas to Tennessee Gas Transmission Co. over the next 20 or more years.

The FPC issued the necessary sales certificate last month. But it wrote into it a 4.4 cents per M.c.f. cut in price. The C.A.T.C. Group had asked for an initial price of 22.4 cents per M.c.f., including the 1-cent gathering tax. FPC cut the initial rate to 18 cents, including tax, and allowed the producers to file for a rate increase for the remaining price to be effective one day after deliveries begin *(The Oil and Gas Journal, May 27, page 93)*.

The companies announced they would not accept the certificate and the contracts would be terminated. T.G.T. asked for a rehearing, which was granted. Last week the issue was argued before the commission.




**Gus II Shoves Off:** Faced with a multiple-well drilling program in deep water off the Louisiana coast, Mr. Gus II sets forth on its maiden voyage. Built for C. G. Glasscock Drilling Co., the $6,500,000-vessel is the most expensive mobile platform ever constructed. It's designed for 150-ft. depths during nonhurricane seasons. Commissioned at Beaumont, Tex., the vessel's itinerary includes a trip down the Neches River to the Sabine Pass area for final derrick work. The C.A.T.C. Group plans to initiate the rig at a test in Block 48, Grand Isle area, in water 80 ft. deep. After that, the rig will move into deeper water.

Now the FPC must decide whether to stick by its original order or bow to the demand that it set a price that will hold firm.

**Warnings come true . . .** The C.A.T.C. case is the biggest single piece of evidence yet given that the industry was right when it warned that federal regulation would curtail gas supply.

If the deal falls through, T.G.T.'s customers will "face the grim reality of suffering the loss of natural-gas supplies which are required to insure adequate and continuous long-term service and to meet the expanding needs of the consumers," T.G.T. told the FPC.

The C.A.T.C. Group is playing for high stakes. The 4.4 cents knocked off the contract by the FPC is a cut of over 20 per cent. But in dollars it's even more impressive. A cut of even one penny would amount to more than $60 million over the life of the contract.

And if the group accepted the certificate offered last month and filed for an increase, as suggested, the FPC might wind up next year by holding the contract price too high by more than one cent.

If both the FPC and the producers stand firm and the T.G.T. contract is canceled, T.G.T. will face the problem of marketing the gas produced under their leases from the government.

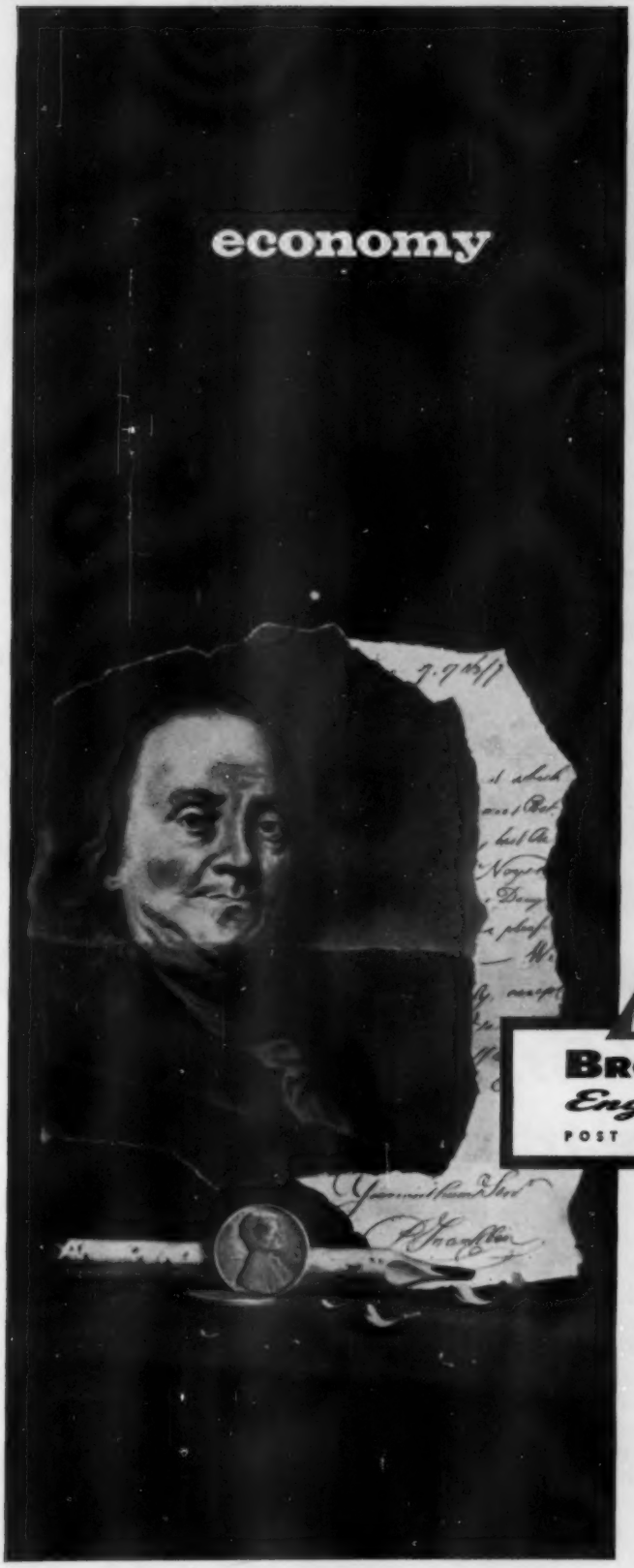
The natural outlet would be the intrastate market—provided the courts don't rule some time that the outer Continental Shelf is beyond state boundaries and the gas, therefore, is in interstate movement between the wells and the shore.

## Oil Properties Bought

DALLAS.—Producing Properties, Inc., Dallas, last week paid a little more than $1,000,000 for oil properties in Slocum and Kelly-Snyder fields.

The company paid $895,000 for an undivided interest in 49 wells in Slocum field of Anderson County, East Texas. Sellers were John Pace, Houston, and J. Robert Phillips, Jack D. Orr, and F. C. Gaines, Jr., all of Dallas.

In a second deal, Producing Properties bought a small property in the SACROC unit of Kelly-Snyder in West Texas from E. E. Fogelson of Dallas. Payment was $63,340 in cash plus a $141,500 deferred payment out of production. The purchase was in addition to another made from Fogelson on May 20.

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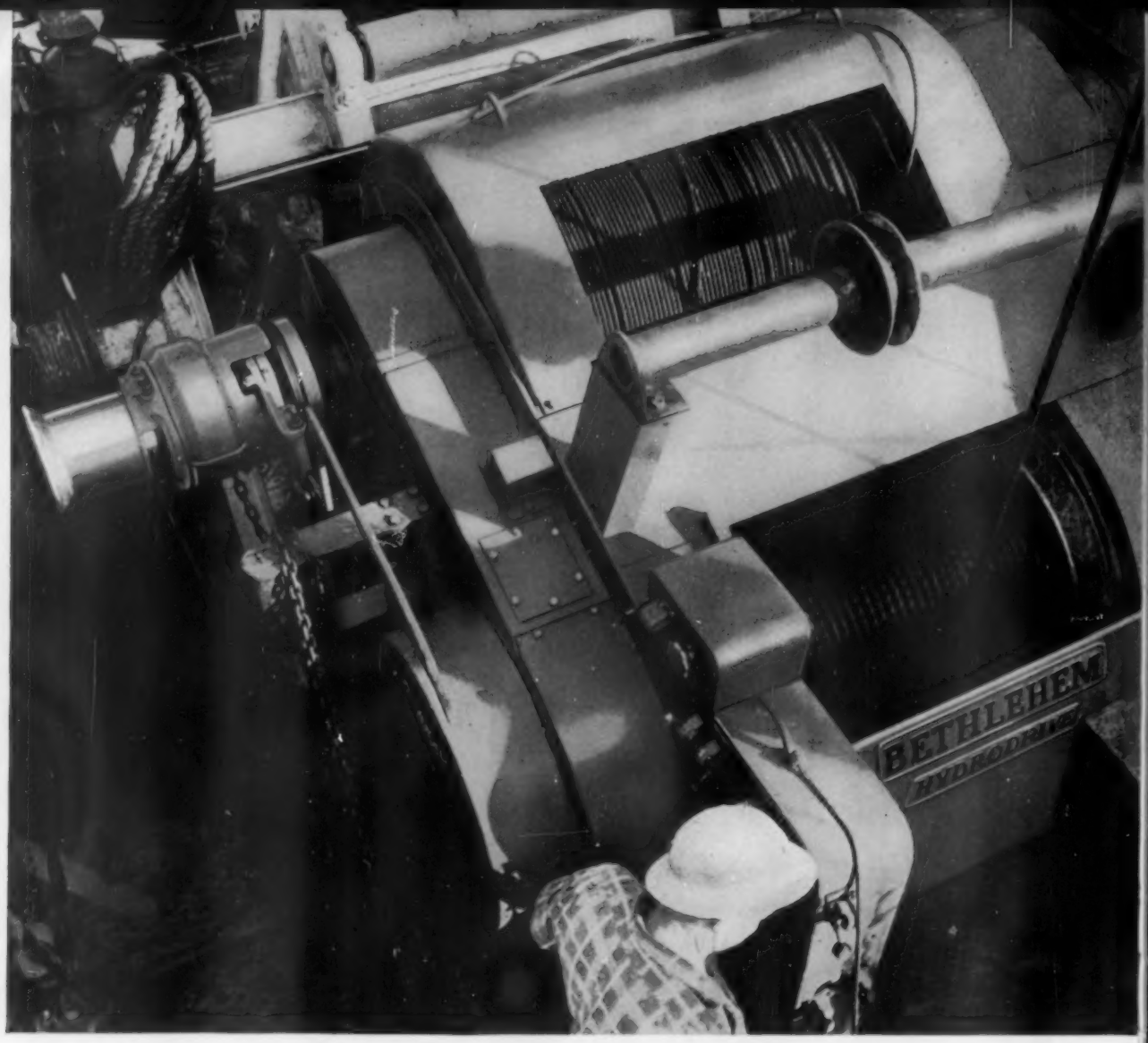


# *Smooth and Fast in Action...*

# Easy to Move from Job to Job

For the contractor who is always on the go, Bethlehem offers two lightweight rigs with outstanding advantages. Known respectively as the S-45-E and the C-50, these two rigs have convincingly proved their worth in all areas, under a wide range of conditions.

*The S-45-E* is intended primarily for slim-hole drilling and for medium-depth service and workover jobs. It is equipped with air-friction clutches, torque-converter drive, and big, powerful brakes. The unit is portable in every sense of the word; together with derrick and other components, it can easily be mounted on a trailer.

*The C-50,* a somewhat larger rig, is designed for shallow-to-medium conventional drilling and deeper slim-hole drilling. This sturdy, streamlined rig has torque-converter drive and choice of transmissions as follows: two speeds forward, three speeds forward, or two speeds forward and one reverse. Like the S-45-E, the C-50 is completely suitable for trailer mounting where this arrangement is helpful.

Because of the torque-converter feature, both these rigs are unusually smooth performers. They're fast in action, too. And when moving day arrives, they can be hauled so quickly and easily to the next location. Write for descriptive literature — or ask our nearest office for full details.

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## Canadian Upset

### Election won't affect oil now, but it could later

WASHINGTON.—Last week's political upset in Canada will have no immediate effect upon the operations there of U. S. oil interests.

Experienced Washington officials believe that the margin by which the Conservatives ousted the 20-odd year Liberal government is too slim to provide support for any drastic moves.

But they say that if John Diefenbaker, expected to be the new prime minister, adds support in the next election new impetus may be given his aim to carve out a greater field for Canadians in the development and use of Canadian resources.

For some time the idea has been spreading that Canadians should have more top posts in the Canadian subsidiaries of U. S. firms. Diefenbaker is expected to play this theme, particularly in the fields of oil and gas. U. S. interests own about three-fourths of those industries in Canada.

The Conservative party, which Diefenbaker heads, opposed the Trans-Canada gas pipeline. But observers say this was more for the purpose of embarrassing the Liberal government than of halting the line.

Diefenbaker, however, is reported to have said during the campaign that he opposes the export of natural gas to the U. S. The gas should be kept at home for the building up of Canadian industry.

No serious impact is expected to U. S. interests even if the conservatives hold the government for an extended period. But there may be a gradual trend toward more "home rule" for the Canadian subsidiaries of U. S. oil and gas companies.

## Commission Fights Pollution

AUSTIN.—The Texas Railroad Commission is getting tough with producers who cause fresh-water pollution by storing brine in surface pits.

Operators in three more Texas fields were ordered to stop disposing of salt water in pits by July 31—or face being cut off from pipeline connections. The three fields are Jackson Strawn of Stephens County, and Norton and West Norton fields of Runnels County.

The commission is permitting some exceptions in Jackson Strawn field where operators are pit-storing only minor quantities of salt water and are not polluting fresh-water sources.

## Processing briefs

**A catalytic reformer and auxiliary** facilities with total capacity of 11,000 bbl. of naphtha daily have been completed in Continental Oil Co.'s refinery at Ponca City, Okla. Besides upgrading high-octane gasoline, the new facilities will produce light aromatics for use by Conoco in manufacturing petrochemicals.

**Frontier Refining Co. plans to expand** capacity of its Cheyenne refinery from 16,500 to 22,000 bbl. daily. The company also plans to double the refinery's asphalt-plant capacity to 10,000 bbl. daily. Details of the expansion have not been completed.

**Unity Petroleum Corp.'s 1,200-bbl.** refinery at Kalispell, Mont., will be reactivated to produce jet fuel under an Air Force contract. Willard Aronow, president, said 700 to 1,000 bbl. of crude oil will be processed daily. Aronow said reduced freight rates granted the refinery enabled it to get back into operation.

**Two new units have gone on** stream at United Refining Co.'s 8,500-bbl. refinery at Warren, Pa. The units are a 2,500-bbl. fluid catalytic cracking unit and a 230-bbl. polymerization plant. Both units were designed, engineered, and licensed by Universal Oil Products Co.

**Paraxylene capacity will be boosted** by 25 million pounds per year at the Richmond refinery of Standard Oil Co. of California. A $3-million unit will be completed adjacent to existing paraxylene extraction facilities in early 1958. The expansion is prompted by a rapid growth in demand for synthetic fibers and plastic packaging from the aromatic component of catalytic reformate.

**Projected commercial jet fuel demand** will probably not be altered by the cancellation of Capital Airlines' order for 15 Vickers Viscounts. Trans World Airlines' Howard Hughes is interested in picking them up to step up T.W.A.'s entry into the jet race.

**Standard Oil Co. of California and** subsidiary companies are now marketing their new RPM supreme motor oil at no increase in price over the previous premium grade. It has a detergent compound which virtually halts excessive engine wear in stop-and-go driving, California Standard says. Tests also showed that preignition and octane requirement buildup were reduced.

**Firestone Tire & Rubber Co. has** started production at its new butadiene plant at Orange, Tex. The plant has a rated capacity of 40,000 tons per year. It will supply butadiene for Firestone's synthetic-rubber plants at Lake Charles, La., and Akron, Ohio.

## *Also for Refiners . . .*

Many refiners are cutting back runs and calling for a similar industry-wide movement to restore stability to the gasoline market. Overproduction is blamed on many factors, mainly failure of demand so far this year to live up to expectations. Strikes are helping some companies cut down runs. Producers will feel a pinch next (P. 95). . . Oil-country steel is growing more plentiful, but a price hike in basic steel is still in the cards for July 1. This will include steel items used by refiners (P. 98). . . Esso Standard has borrowed a management idea from Jersey Standard. It's an operating committee which serves as a chief of staff between the board of directors and various departments (P. 101). . . The O'Mahoney committee in a preview of its investigation report indicates it will have something to say on price leadership in sale of petroleum products (P. 104). . . A Houston service-station operator found the price of his competitors' gasoline so low, he sent a tank truck around, bought some and sold it 4 cents higher (P. 105). . . Cities Service Oil's new products research lab at Cranbury, N. J., boasts a hot cell for radioactive work (P. 107). . . Shell, Texas Gulf Sulphur, and Devon-Palmer Oils plan a 300-ton sulfur plant in Okotoks gas area near Calgary (P. 111). . .

**PLUS THESE TECHNICAL FEATURES:** Tips on better operations of both sulfuric acid and HF alkylation units (P. 132). . . The Foreman's Page (P. 183). . . Field Processing (P. 185). . . Questions on Technology (P. 187).

# Offshore Rates Rise

## California Senate passes bill raising royalty minimum and giving state right to lease tidelands on any basis it likes

SACRAMENTO. — California oil companies will have to pay higher royalty rates on the state's tidelands.

This was assured last week when the state senate passed by a 33-2 count the Allen Miller bill previously passed by the assembly.

Gov. Goodwin Knight has 10 days in which to sign it. In view of the overwhelming support for the bill in both houses, it is unlikely he will fail to do so.

Miller's bill has the effect of giving the state the right to put up offshore acreage for bidding on any basis it likes. The only restriction is that all royalty rates must begin at at least 16⅔ per cent.

The measure changes the royalty provisions of the 1½-year-old Cunningham-Shell Act. It calls for awarding leases either on a cash-bonus basis plus a fixed or sliding scale royalty, or simply on the basis of the highest royalty bid.

The new bill also tosses out the former 1,920-acre minimum size restriction on parcels. The maximum per parcel size of 5,760 acres is retained. The former highly controversial requirement of classifying lands as either proven or wildcat is discarded.

The new law becomes effective 90 days after the legislature adjourned June 12.

According to Frank Hortig, State Lands Commission engineer, it will be Christmas or later before requests can be processed again for bidding.

**Warnings. . . .** During the months the legislature held hearings on the Miller bill and other bills designed to raise royalty rates, the oil industry was virtually unanimous in its opinion that any such move would wreck offshore work.

Several companies announced they were quitting tidelands core-hole and seismic work because of the "political climate" which indicated that rates were going up.

Early last month Olen Lane, vice president of Continental Oil Co., warned that adoption of the Miller bill with its sliding scale bidding technique would be disastrous to the state's offshore drilling program.

Efforts to present a solid front against Miller's changes were upset in May when Charles S. Jones, president of Richfield Oil Corp., came out 100 per cent in favor of them.

**Present status . . .** According to the State Lands Commission, the Miller bill in effect wipes everything pending under the Cunningham-Shell Act off the books.

At the time the legislature convened in January, the commission was processing six parcels for leasing. They were:

**. . . A 5,500-acre block** off Point Mugu, Ventura County. Superior Oil Co. had submitted a bid on this parcel, but it was returned unopened when the legislature asked the commission to hold off.

**. . . Five 5,000-plus acre parcels** between Point Conception and Elwood, Santa Barbara County. Bids were to be opened on these March 1 when the lease ban went on.

Whether the companies originally asking that these parcels be put on the block now will renew their requests remains to be seen. But, when September rolls around, many think the oil companies will be back in there bidding—but at probably considerably lower bonuses than before.

Only one major parcel was awarded under the royalty provisions of the Cunningham-Shel Act. It was a 5,500-acre lease at Summerland which went to Standard Oil Co. of California and Humble Oil & Refining Co. for a cash bonus of $7,250,000.

Another smaller 500-acre lease, also at Summerland, went to Tidewater Oil Co. for $75,000 last summer.

# New L.P.G. Line in Operation

DALLAS.—Gulf Refining Co. has started pumping Permian basin L.P.G. through its new 530-mile, 10-in. products carrier to the Gulf Coast near Houston.

L.P.G. from plants at Monument and Eunice, N. M., and the Fullerton plant in Andrews County, West Texas, is funneling through a 6 and 8-in. gathering system into the main 10-in. at Midland.

The main line runs from Gulf's Waddell plant in Crane County to Midland then via Abilene, Fort Worth, and Lufkin to Mont Belvieu near Houston.

Present line capacity is 6,000 bbl. daily. This will go up to 30,000 bbl. daily with completion of pump stations along the line.

Actually, only 162 of the 530 miles of main line is new pipe. Gulf was able to convert and incorporate a 10-in. crude line between Midland and Lufkin. The line had been idle about 5 years.

Crude which had traveled through it was switched to the big West Texas-Gulf carrier when the latter was completed.

New construction included:

**. . . A 116-mile section** of 10-in. from Lufkin to the coast.

**. . . A 46-mile section** of 10-in. on the other end from the Waddell plant to Midland.

**. . . About 80 miles** of 6 and 8-in. gathering lines from other West Texas and New Mexico plants into Midland.

Cost of the line is fixed at about $14,000,000.

Facilities on the coast to receive, process, and store the products will bring total cost of the entire program to about $20,000,000.

Gulf plans to erect fractionating facilities near Mont Belvieu to separate products commingled in the line *(The Oil and Gas Journal, November 12, 1956, page 132).*

And it is enlarging its underground storage space in the Barbers Hill salt dome near the coast terminal of the line. Storage capacity here is expected to be as large as any similar installation in the industry.

**Big market seen . . .** Though Gulf Refining will own and operate the pipeline, its subsidiary, Warren Petroleum Corp., will take over from that point.

Warren will own the storage and handle the marketing through its big barge, tanker, and tank-car fleet.

Besides products marketed through the established Warren facilities, the companies are eying several other potent possibilities.

L.P.G. is growing fast as a popular raw material for petrochemical manufacture or for isomerization or reforming into high-octane components.

The products can be used at Gulf's plants in this manner or sold to others for these purposes.

The Gulf line is the third products carrier to go into operation between West Texas and the Gulf Coast.

Magnolia Petroleum Co. has had a similar 8 and 10-in. carrier, partially new and partially converted crude line, piping L.P.G. from Midland to Beaumont for a year and a half.

Phillips Petroleum Co. jumped in later, buying a crude line from Shell Oil Co. and converting it to products.

# 186,000 BBLS. IN NEW STORAGE CAPACITY, AND—

## ...THE INSTALLATION OF FLOATING ROOFS PAID OFF IN JUST 6 MONTHS!

It happened at Knoxville, Tenn. That's where General American built a 6-tank terminal—including a 55,000 bbl. jet fuel pipeline storage tank—for Republic Oil Refining Company, a Division of Plymouth Oil Company.

"General American's unique experience in constructing and operating their own terminals helped us with our problems," says Holland Howell, Republic's chief engineer. "What's more, we found General American's 12-18 month payout estimate quite conservative. Through savings in filling and breathing losses alone, *the installation of floating roofs paid off in only 6 months!*"

As a result of this proved performance—speedy, dependable construction, definite savings and improved safety through use of Wiggins Floating Roofs—General American was authorized to build additional facilities for Republic. At Belton, South Carolina, tanks for the storage of 160,000 bbls. have been completed. At Doraville, Georgia, General American is now erecting a 110,000 bbl. sales terminal, and will erect another terminal at Macon, Georgia.

*It pays to plan with General American*

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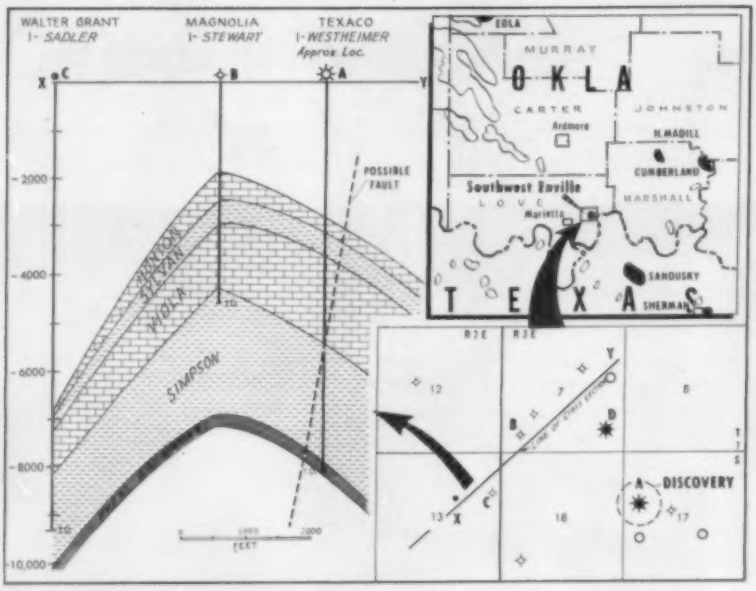



**ONE INTERPRETATION of Southwest Enville: A tremendous anticline.**

# Big New Structure?

## Southern Oklahoma discovery could be an anticline with 2,000 ft. or more of relief; it may change some thinking

MADILL, Okla.—Southern Oklahoma is still turning up some pleasant surprises for exploration geologists in the form of possible big new oil fields.

Only a few months ago the average oil finder had placed southern Oklahoma at the bottom of the structural barrel. He scoffed at ever finding structures with as much as 2,000 ft. of relief. Most geologists considered all such prospects already discovered at Velma, Carter-Knox, or Eola. The smart oil finders had turned to looking for strat traps.

Southwest Enville field in Love County, however, may change this concept. Production was found there in the Basal Oil Creek sand in an area where this possibility was considered remote.

More important is the size of the structure. A simplified cross section indicates at least 2,000 ft. of relief. Strangely too, this occurred at a time when most Oklahoma geologists were looking for structures with less than 50 ft. of closure.

**Some questions . . .** Nature of Southwest Enville's structure at the moment is anyone's guess.

The big question is: What controls production? Is it a simple anticline as shown in the cross section. Or will drilling reveal complexly faulted oil field? That's the case at prolific Eola field on the north flank of the Arbuckle Mountains 50 miles north.

Faulting undoubtedly is present. But there is only a handful of wells on the prospect now—not enough to give a complete structural picture. Ironically, the highest well on the structure did not go deep enough to test the Basal Oil Creek sand.

Magnolia Petroleum Co. bottomed that well in the Simpson section some 1,600 ft. above the Basal Oil Creek. Operator set 7-in. casing and attempted to complete the well in shallow sand. Magnolia finally abandoned the test in February 1945.

**Complex geology . . .** Discovery well for Southwest Enville was The Texas Co. 1 Westheimer (A on map).

It blew out at 8,785 ft. after penetrating less than 10 ft. of Basal Oil Creek. After innumerable difficulties, Texaco finally was forced to kill the well, plug back to 6,050 ft. and complete in a whipstocked hole.

The Westheimer was completed for a calculated open-flow potential of 20,759 M.c.f. of gas daily plus 192 bbl. daily of distillate. Texaco since has confirmed the pool discovery with its 1 Dexter. This well also threatened to blow out when topping the Basal Oil Creek. Texaco has set 7-in. casing at 8,276 ft. with the top of the sand reported at 8,669 ft. and is now completing (D on map).

The wells have cored steeply dipping beds. Dips of 60 degrees are probably the rule. This means, of course, tough drilling problems, expensive wells, and plenty of headaches.

**Significance . . .** Southwest Enville is proving important for two reasons:

**. . . It opens a new area** in southern Oklahoma to the possibility of Basal Oil Creek production.

**. . . It revives the idea** that large undiscovered oil fields still exist in the area.

Regional geology actually points to this conclusion also and makes Love, Marshall, and Bryan counties a prime deep-oil hunting-ground.

The known lines of surface folding extend southeast into these counties from Eola field. Similar folds harboring rich Basal Oil Creek reserves also exist on the same trend in Grayson County, Texas, just across the Red River.

At least Southwest Enville also may dispel this theory. It promises to form another link uniting Basal Oil Creek production in Grayson County, Texas, with similar prolific production in Love, Marshall, and Bryan counties, Oklahoma.

# Water Gets Deeper

## Gulf, Humble plan test in water 120 ft. deep

NEW ORLEANS.—Gulf Refining Co. and Humble Oil & Refining Co. are about to set a new water-depth record in offshore operations.

A stationary platform is being erected on their South Timbalier Block 135 lease, in water 120 ft. deep.

Cost of the drilling platform has been estimated at $500,000.

Previous record for deep-water operations in the Gulf of Mexico was credited to the C.A.T.C. Group, which started drilling in 112-ft. water in the Grand Isle area off Louisiana a year ago. Since then, Gulf-Humble operations in the Block 135 area have approached if not surpassed the C.A.T.C. record.

Location of the Gulf-Humble test is about 33 miles south of the Lafourche Parish coast. It is 2,000 ft. from the south and 3,500 ft. from the west boundary of Block 135.

Designated the Gulf B-1 OCS 0462, the well is projected to 14,000 ft. Location is about 3 miles seaward from present production in Block 135 field.

Gulf will be operator in the new venture with Humble.

# Pipeline Under Way

## Four Corners project gets started as contracts let

HOUSTON. — Construction will start immediately on the Four Corners Pipe Line.

The line will move crude oil from fields near the common corner of New Mexico, Colorado, Utah, and Arizona to refineries in the Los Angeles area.

R. G. McIntyre, president of Four Corners Pipe Line Co., said that contracts have been let for construction of 485 miles of the approximately 750-mile system.

**. . . A. P. Vaughn Construction Co.,** Fort Worth, and Potashnick Construction Co., Cape Girardeau, Mo., will jointly build 170 miles of 16-in. line from Aneth field in southern Utah to Cameron, Ariz. Work on this segment will begin immediately.

**. . . R. H. Fulton Construction Co.,** Lubbock, will build 98 miles of 16-in. line from Cameron to Seligman, Ariz., and 217 miles of 16-in. from the Colorado River to Olive, Calif. Construction on the segment from Cameron to Seligman will begin about July 1. Work on the other section has been delayed until October.

Contracts will be let in the near future for construction of the remaining four sections and a major crossing on the Colorado River.

Survey work is complete, McIntyre said, and 16-in. line pipe is arriving on schedule. A field office has been established at Flagstaff, Ariz., under direction of J. K. Alfred as field manager.

The main line will include 635 miles of 16-in. pipe from Aneth field to Los Angeles. In addition, there will be 86 miles of 12-in. from New Mexico's Bisti field to Red Mesa station about 35 miles southeast of Bluff, Utah, and about 3 miles of 6, 8, and 10-in. feeder lines from other fields in New Mexico and Utah.

## Two More Barges Christened

HOUSTON. — Two new drilling barges were christened at Gulf Coast shipyards last week.

Penrod Drilling Co. took delivery of a submersible drilling barge designed to operate in 70-ft. waters. The vessel was built by Bethlehem Steel Co. at its Beaumont shipyard.

At Orange, Tex., Producers Drilling Co. christened its barge, the "W. F. Youngblood," designed for drilling in marshlands. The barge was built by Levingston Shipbuilding Co.

# Pipeline briefs

**Eastern Pipeline Contractors, Dallas,** will start work next week on 80 miles of 20-in. gas line for Natural Gas Pipeline Co. of America from Bridgeport, Tex., to Healdton, Okla. This is part of a 350-mile 20 and 26-in. line which Natural will lay from Jack and Wise counties, Texas, to Fritch, in the Texas Panhandle, on its system to Chicago.

Most of the pipe should be on hand by July 1. The Red River crossing has been let to R. H. Fulton & Co. and the gathering system to Fulton & Brodie, Inc. The remainder of the main line will be contracted later. The entire project is to be completed by December.

**River Construction Corp. expects to** finish laying 82 miles of 8 and 10-in. line on the extended products system of Southern Pacific Pipe Lines, Inc., July 15. This section is between Richmond and Stockton, Calif.

River Construction also is moving ahead with the Peace River gathering system for Westcoast Transmission Co., Ltd., in northeastern British Columbia. The 142 miles of 12, 18, 20, and 26-in. is to be completed September 1.

**Permian Basin Pipeline Co., subsidiary** of Northern Natural Gas Co., will build facilities in West Texas to take up to 200,000,000 cu. ft. of gas daily. Initial deliveries will be 60,000,000 to 70,000,000 cu. ft. Permian will build 83 miles of 16-in. from its Spraberry station in Midland County, to tie in with Pioneer Gathering System, Inc., in northwestern Schleicher County. Permian also will construct a 3,960-hp. compressor station.

Pioneer will build 70 miles of pipeline, primarily 12 and 16-in., and one compressor station providing an outlet for shut-in gas wells and oil-well gas which has been flared for several months. The wells are located in Sutton, Val Verde, and Schleicher counties. The two projects, costing $9½ million, will be completed early this fall. Pioneer is a subsidiary of Pioneer Natural Gas Co., Amarillo, Tex.

**Southern Natural Gas Co. will ask** the Federal Power Commission this week for a permit to connect 10 fields in Plaquemines, St. Bernard, and Jefferson parishes, Louisiana. Southern Natural would spend $7,672,480 on pipeline and compressor facilities to tap the Gulf Coast reserves, part of which are under water. Producers are Gulf Oil Corp., Kerr-McGee Oil Industries, Inc., Tidewater Oil Co., Magnolia Petroleum Co., and Phillips Petroleum Co.

**Buckeye Pipe Line Co. is due to** complete conversion of a 116-mile 8-in. crude line in Indiana July 10. The line, part of an old dual 8-in. system from Griffith to Huntington, Ind., formerly pumped crude eastward from the Chicago area.

It is being converted to products, giving Ohio refiners an outlet to the Chicago market. Sheehan Pipe Line Construction Co., Tulsa, is handling the takeup, reconditioning, and relaying job. Sheehan starts June 20 on a similar project in eastern Ohio involving 70 miles of 8-in. crude line.

## *Also for Pipeliners . . .*

Crude movements will be altered by series of cutbacks in refinery runs, strikes, and reduction in production (P. 97) . . . Oil-country steel is growing more plentiful but a price hike in basic-steel prices is still set for July 1 (P. 98). . . Canada's first automatic steel-pipe plant has been opened by Mannesmann Tube Co. in Sault Ste. Marie, Ont. (P. 99). . . El Paso Natural has launched Panhandle's biggest gas-development campaign after a deal to acquire 53,000 acres of leases from Phillips in Beckham County, Okla. (P. 100) . . . Spreads are rushing to complete a 241-mile gas pipeline between Topock, Ariz., and Newhall, Calif. (P. 103). . . An immediate investigation of oil-company ownership of pipelines apparently will be one of the recommendations in an upcoming O'Mahoney investigation committee report (P. 104) . . . Eisenhower has given new life to the natural-gas bill, but the big question still is: Will the Senate act on it before adjournment even if bill gets by the House? (P. 108). . . The C.A.T.C. Group is refusing to sell its offshore gas to T.G.T. unless a firm price is fixed by FPC in advance (P. 112). . . Gulf Refining has started operating its new 10-in. products carrier from the Permian basin to the Gulf Coast (P. 116). . . Construction is starting on the Four Corners crude pipeline (P. 119).

**PLUS THESE TECHNICAL FEATURES:** Part 2 of an article on how Standard-Vacuum moves heavy Sumatran crude (P. 127). . . Pipeline Patrol: Operating Pointers (P. 175).

# New Well Lifts Israel's Hopes

ISRAELI EXPLORATION has received a shot in the arm from a new well 5 miles southeast of the original Heletz discovery.

The well, drilled near Broor Haiel, is 2 miles southeast of Heletz 10, the most southeasterly outpost well in the country's first field.

The operators, Lapidoth Israel Petroleum Corp., Ltd., and Israel Prospectors Corp., Ltd., have not determined whether the new test is a new field or extension of Heletz production. There may be a saddle between the two areas.

The main sand was topped at 4,990 ft. It is the same formation which produces at Heletz. There is 15 ft. of net pay.

Production tests were not completed last week. But during a short period of trouble the well blew out to a height of 90 ft. The thinner layer of sand found at Heletz was mixed with oil and water.

Heletz currently produces about 2,000 bbl. daily from a dozen wells. Lapidoth hopes to double output by the end of the year.

Among the other exploration activities in the country, Israel Mediterranean Oil Co. and Pan Israel Oil Co. plan a refraction program in the coastal plains area. Equipment is due to arrive from Houston on July 5.

The companies hope to pin point anomalies in the area with the new survey. The new program also will include a reflection study of Kurnub structure in the Negev desert.

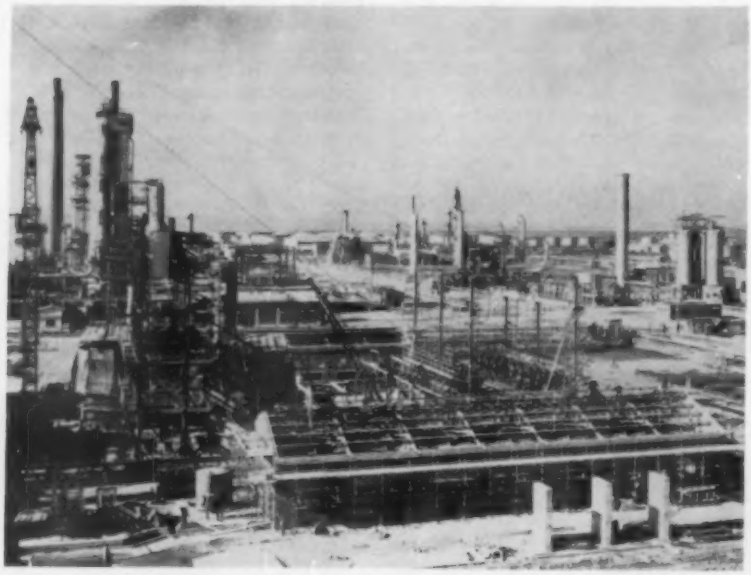
Israel Mediterranean and Pan Israel jointly hold licenses on a total of 250,000 acres. They also have a farmout on a 90,000-acre concession held by Israel Continental Petroleum starting 2½ miles due east of the Broor Haiel well.

## Superior Moves Fast in Lake

SUPERIOR Oil Co. is wasting no time starting drilling operations on its new 7,776-acre concession in Lake Maracaibo.

Superior's first well was spudded June 5. A second barge arrived a few days later to drill on the same block. Superior also is building a 2,000-ft. pier on the lake's west side as a base for its marine operations.

Other operators in new lake acreage initially have followed the policy of one well at a time.



**British Expansion:** Capacity will climb from 90,000 to 140,000 bbl. daily when British Petroleum Co., Ltd., completes its big expansion program at the Kent refinery near London. The $74,000,000 expansion includes this distillation unit, the second such unit at the plant. Over-all expansion will not be completed until 1958, but increased throughput will be available by next December.

## Deep Pay Zone Hit

### New well hints French have a big structure in Algeria

THE FRENCH have apparently established a sizable structure in the mid-Sahara Desert region of Algeria.

Reports from Paris last week indicate that the third well in the vicinity of the Hassi Messaoud discovery has encountered a deep productive zone. The latest well, MD 2, is 6 miles southwest of the discovery. It is the second successful stepout. OM 1 encountered the Hassi Messaoud pay at about 10,725 ft. almost 5 miles to the north of the discovery *(The Oil and Gas Journal, May 27, page 107)*.

The more than 10-mile bracket formed by the second and third wells, with the discovery almost in the center, leads the French to believe that the Hassi Messaoud structure is even larger than they first thought.

MD 2, like the two previous wells, was drilled by Ste. Nationale de Recherche et D' Exploitation des Petroles en Algerie (SN REPAL). It is located on the L'Oued Mya license held by the government-sponsored company. SN REPAL and Cie. Francaise des Petroles (Algeria) have pooled their efforts and equipment in an intensified campaign aimed at developing the discovery as quickly as possible.

A fourth well, MD 3, is going down less than 3 miles to the northwest of the discovery well and should be nearing the pay depth. A month ago it was drilling only about 800 ft. behind the well which the French say extends the limits of the field far to the south.

## Venezuelan Thick Pay Fades

Bright prospects have faded for the Venezuelan Atlantic Refining Co. well northwest of Santa Barbara field.

The 4 Pirital caused excitement throughout Venezuela when electric log interpretation reportedly indicated unusually thick prospective oil sections for eastern Venezuela.

But on further tests, the well flowed fresh water with only small traces of oil. There was a good chance that the test may be completed as a fresh water well.

## Sun Closes Deal

### Five blocks signed up in Pakistan in latest move

PAKISTAN SUN OIL CO. has acquired concession rights on 10,000 sq. miles in Pakistan.

The wholly owned subsidiary of Sun Oil Co. obtained rights on five concession blocks. All are located in the southern and southwestern part of West Pakistan. The acreage is the maximum available under the country's law.

Under the contract, the Pakistan Government will share initial exploratory and development expenses to an extent of 25 per cent. This arrangement is similar to the participation the government has in other exploration programs.

"We in Sun like the potential of Pakistan," Ted C. Stauffer, director of Sun Oil's foreign production and president of Pakistan Sun, said. "We hope to put two geological surface parties to work during the first year. Their work will be followed by other geological studies and by geographical surveys of selected areas."

**Current drilling . . .** Hunt International Oil Co., the first U. S. company to start drilling West Pakistan acreage, is drilling ahead on its third wildcat.

Its 1 Dhak located 100 miles west of Karachi was taken to 8,404 ft. and 2 Dhak to 14,614 ft. Both were dry holes.

The present test, 1 Sari Sing, is drilling ahead at 5,400 ft. It is located in Dadu district 45 miles northeast of Karachi.

Standard-Vacuum Oil Co., the third U. S. firm holding exploration rights in the country, is drilling its second test in West Pakistan. The 1 Mari, 225 miles northeast of the first wildcat, 1 Digh, was drilling ahead at 10,750 ft.

The Digh test was a dry hole. It was located 134 miles east of Karachi.

### India Survey "Encouraging"

INDIA'S FIRST large-scale aerial search for oil, covering about 107,000 sq. miles, has been completed with "extremely encouraging" results.

Spartan-Canadian Aero of Ottawa conducted the survey for the Indian Government. The biggest area studied was 90,000 sq. miles on the plains between the Ganges River and the Himalayan foothills in northeastern India.

The survey also included a 17,000-sq.-mile swath through Rajasthan in the northwest part of India adjacent to Pakistan.

Spartan-Canadian officials said that "while this does not mean we can now say there is oil there, the information is of great value as a guide for gravity and seismic exploration."

The survey was paid for jointly by Canada and India under the Colombo Plan for underdeveloped countries. It was carried out entirely by the Ottawa firm.

## Barge Ordered

### Unit will be used to drill in tidal swamps of Nigeria

SHELL-BP Petroleum Development Co. of Nigeria has ordered its first drilling barge.

The $3,600,000 unit will operate in tidal swamps in the Niger Delta. These extend from 30 to 40 miles from the coast and are flooded to a depth of 4 ft. or more at high tide. At low tide the area is cut by numerous creeks.

Shell-BP expects to spud its first well from the barge about 20 miles south of Port Harcourt, in the estuary of New Calabar River. The 3,000-ton barge is scheduled to arrive in October from a Rotterdam shipyard.

The company also has awarded a bid to Taylor Woodrow (Nigeria), Ltd., for a 65-mile, 10-in. pipeline from Oloibiri field to Port Harcourt. The line will take crude during production tests which will begin on January 1 next year.

The possibilities of commercial production are not definitely established. But the company decided a crude line for the test had more advantages than tankage at the remote field. During production trials wells will be tested at the rate of 1,000 bbl. daily.

### Russia Drilling Deeper

RUSSIA, like the United States, is going deeper in search of oil and gas.

In 1953, 42.8 per cent of the country's wildcats were completed at less than 3,963 ft. Last year only 16 per cent of them were in this depth bracket. Of the remaining wildcats last year, 26 per cent were bottomed between 3,936-5,904 ft., 35 per cent between 5,904-8,200 ft., and 23 per cent deeper than 8,200 ft. Development drilling is following a similar pattern.

In 1960, 7 per cent of Russia's wildcats are scheduled to go to 3,936 ft., 34 per cent to the interval 3,936-5,904 ft., 31 per cent to the interval 5,904-8,200 ft., and 28 per cent below 8,200 ft.

## Sicily Makes Deal

### Italian agency hopes to sign up new concession

THE SICILIAN Government may get into the oil business with Ente Nazionale Idrocarburi, the Italian Government's oil agency.

Sicily has accepted a proposal by E.N.I. for a concession arrangement that gives the government a risk-free chance of ownership in oil operations. Under the terms, the Sicilian Government will have an option to acquire 25 per cent interest if commercial production is found. There is no obligation if efforts fail. The government also would receive rents and royalties, and E.N.I. would participate in local sulfur and chemical industries.

Some details remain to be worked out before the contract can be signed. But when the agreement becomes official, the deal will be a feather in the cap of politicians on the Italian mainland who would like to see a virtual oil monopoly for the government extended to Sicily *(The Oil and Gas Journal, January 21, page 76)*.

E.N.I.'s production on Sicily is a one-well field at Gela producing about 1,070 bbl. daily on pump. The 2, 3, and 4 Gela wells are now drilling. The 5 Gela was due to be spudded within a few days. The producing horizon is about 10,600-11,000 ft.

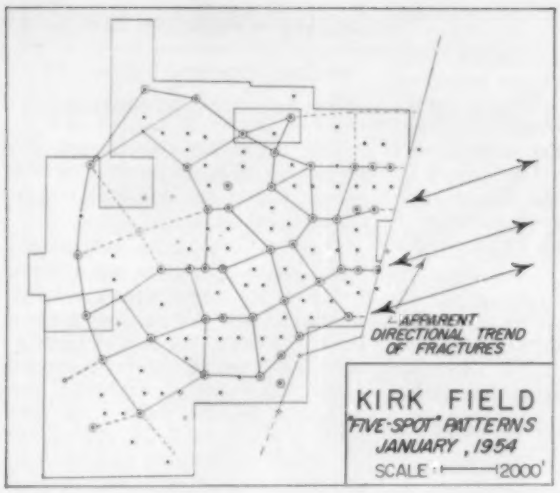
Gela field is about 25 miles northwest of Ragusa field, discovered by a Gulf Oil Corp. subsidiary in 1953, operating under the terms of Sicily's favorable oil law. Ragusa will average 21,000 bbl. daily this year, one of the largest fields in Western Europe.

### Line from Abadan Completed

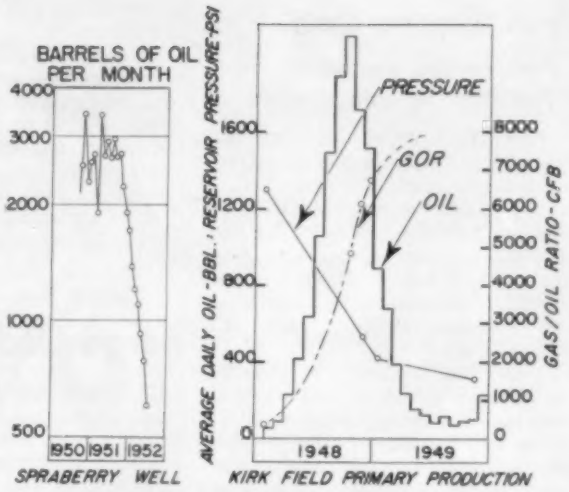
NATIONAL IRANIAN Oil Co. has completed a 10-in. products pipeline from the Abadan refinery on the Persian Gulf to Teheran, 535 miles to the north.

The next step in the $11½-million project is a lateral from Azna eastward to Isfahan in central Iran. The main line has capacity of 20,000 bbl. per day.

Entrepose Co., a French firm, laid the 236-mile northern section that has been finished. Williams Brothers, Tulsa, and Costain-John Brown, Ltd., London, had the contract on the 299 miles starting at the city of Ahwaz, near Abadan. This section was completed last year *(The Oil and Gas Journal, September 24, 1956, page 103)*. Entrepose is building the Isfahan lateral.




FRACTURED LIMESTONE required modified water-flood pattern to recover oil. Fig. 1.




PRIMARY PRODUCTION in these fractured reservoirs showed fast decline and low recovery. Fig. 2.

## A SUCCESSFUL WATER FLOOD OF A FRACTURED RESERVOIR

# Investment-operating costs, $ 743,000
# Value of oil produced, $2,440,000
# Net revenue, $1,697,000

First account of this successful project appeared in The Oil and Gas Journal February 25, 1952. Even though primary operations recovered only 5 per cent of the oil, water flooding has paid off handsomely.

**By P. S. Ervin**

WATER FLOODING the fractured Marble Falls limestone in Kirk field, Eastland and Comanche counties of Texas, has been a success. Soon after water flooding began in 1949, presence of a natural-fracture system became apparent. This required a modified five-spot pattern to flood across the fractures. Results of this method have been recovery of 888,000 bbl. of oil by injection of 8,325,000 bbl. of water to the end of 1955. Primary recovery was only 643,631 bbl. of oil—5.4 per cent of the original oil in place.

Investment of $196,000 resulted in the production of $2,440,000 worth of oil. Deduction of investment and operating costs of $547,000 over 76 months resulted in a net revenue to all interests of $1,700,000 from the water-flood operation.

**Pay formation . . .** Fig. 1 shows the development of Kirk field for water flooding. Productive area of the Marble Falls limestone is 2,944 acres. Depth is about 2,700 ft. Although the limestone is 70 ft. thick, average thickness of the two porous zones is about 11 ft.

Table 1 shows core data from two development wells cored in 1953 and 1954. The original oil in place estimates were based on an estimated porosity of 8 per cent and have not been changed in view of the limited data obtained from only two wells out of 114 drilled in the field. The calculated well capacities based on millidarcy-feet are affected greatly by both the fractures present and acidizing of the wells.

Part of the top section in unit well No. 111 had oolitic type of porosity in the pieces showing relatively high

Author is consulting engineer, Abilene, Tex., and unit operator of North Glen Cove Jennings Sand Unit, Coleman County, Texas. Paper presented at North Texas section A.I.M.E. secondary recovery symposium, Wichita Falls, Tex.

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permeabilities. The fractures apparently extended through the tight section separating the upper and lower porous zones, although they were not as easily discernible.

**Low primary . . .** Primary recovery to August 1, 1949, was 643,631 bbl. and this is assumed to be the total ultimate primary recovery due to the low production per well. Primary recovery was, therefore, approximately 5.4 per cent of original stock-tank oil in place. Ultimate primary recovery from the 2,944 productive acres was 219 bbl. per acre or 19.5 bbl. per acre-foot. Average production per well for 103 new wells was only 4,064 bbl.

Well potentials on original completions were as high as 400 bbl. per day flowing. Average for the field was about 125 bbl. per day after acid treatment.

Primary production history (from discovery in February 1948) is shown in Fig. 2 along with the production history of a typical Spraberry well (Native fracture). Production histories of individual wells in these two fields were similar in several ways, as follows:

1. High initial capacities after fracturing (Spraberry) and after acidizing (Kirk).

2. Abnormal increase in gas-oil ratio and tendency for wells to produce gas only after the reservoir pressure was depleted to 40 per cent or less of the original formation pressure.

3. Wells were difficult to pump.

4. Well fluid capacities decreased to practically nothing after only a relatively small fraction of the oil in place had been produced although gas could still be produced from the wells.

Total primary production per well was of course going to average considerably higher in the Spraberry at the time of depletion. This was probably due to the wider spacing and much thicker net effective section. In March 1954, 380 bbl. per acre was the estimated average primary recovery for 30,000 productive acres of the Spraberry.[1]

### Injection History

From the initial stages to January 1, 1956, 8,325,000 bbl. had been injected into 46 wells at maximum pressures of 900 psig., and average pressures of 750 psig. Water production reduced this figure to a net of 6,661,000 bbl. The gross ratio of cumulative water injected to cumulative oil produced was 9.4 bbl. water to 1.0 bbl. of oil at the end of December 1955. The net ratio was 7.5 bbl. of water injected per 1.0 bbl. of oil produced. Injection history is shown in Fig. 3.

Injection pumps used were capable of handling approximately 800 bbl. per day at 700 psig. on continuous duty. Two pumps were at the initial east side station and four at the south side station. Later, a pump capable of delivering 1,350 bbl. per day at 1,475 psig. was added at a location on the northwest side of the field to handle some of the tighter, lower-capacity injection wells.

Two 18-in.-diameter fresh-water wells with centrifugal pumps and three small-diameter water-producing wells with jet type of pumps were used for the water supply. The centrifugal pump furnished around 3,000 bbl. per day from water sands down to 140

TABLE 1—KIRK FIELD MARBLE FALLS LIME UNIT CORE DATA

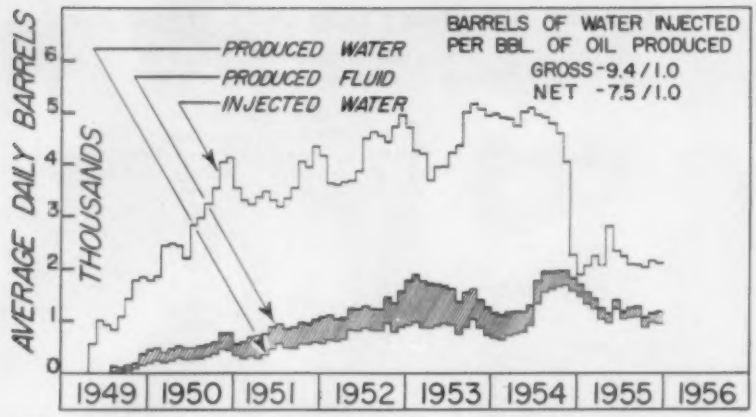
**East Side of Field**
(Unit well No. 111—May 29, 1954)

| Depth (ft.) | Perm. (md.) | Porosity (per cent) | Residual saturation per cent of pore space: Oil | Residual saturation per cent of pore space: Water | Effective section by the core lab. |
|---|---|---|---|---|---|
| 2,725.5 | 0.0 | 7.3 | 16.4 | 58.8 | |
| 2,726.5 | 44.0 | 14.0 | 22.1 | 31.5 | Upper |
| 2,727.5 | 4.5 | 12.4 | 18.6 | 30.7 | Upper |
| 2,728.5 | 1.1 | 11.0 | 21.9 | 38.1 | Upper |
| 2,729.5 | 0.0 | 10.9 | 8.3 | 34.8 | Upper |
| 2,730.5 | 70.0 | 16.2 | 22.2 | 35.8 | Upper |
| 2,731.5 | 4.8 | 15.5 | 21.3 | 34.8 | Upper |
| 2,732.5 | 0.0 | 10.2 | 27.5 | 49.0 | Upper |
| 2,733.5 | 0.0 | 5.7 | 8.8 | 61.3 | |
| 2,734.5 | 0.0 | 4.7 | 14.8 | 66.0 | |
| 2,735.5 | 0.0 | 1.7 | 11.8 | 76.5 | |
| 2,736.5 | 0.0 | 4.3 | 16.3 | 79.2 | |
| 2,738.5 | 0.0 | 1.2 | 0.0 | 91.7 | |
| 2,740.5 | 0.0 | 4.2 | 16.6 | 69.0 | |
| 2,742.5 | 0.0 | 6.6 | 10.6 | 41.2 | |
| 2,743.5 | 0.0 | 10.5 | 15.2 | 52.3 | Lower |
| 2,744.5 | 0.0 | 11.9 | 20.2 | 49.6 | Lower |
| 2,745.5 | 0.5 | 12.1 | 23.1 | 47.9 | Lower |
| 2,746.5 | 0.0 | 17.5 | 24.5 | 40.0 | Lower |
| 2,747.5 | 0.5 | 8.2 | 14.7 | 54.8 | Lower |
| 2,748.5 | 0.0 | 6.1 | 4.9 | 45.8 | Lower |
| Core lab. averages: | | | | | |
| Upper | 18.0 | 12.9 | 20.3 | 36.4 | |
| Lower | 0.2 | 11.1 | 17.1 | 48.4 | |
| Porosity average for all pieces | .... | 9.2 | .... | .... | |

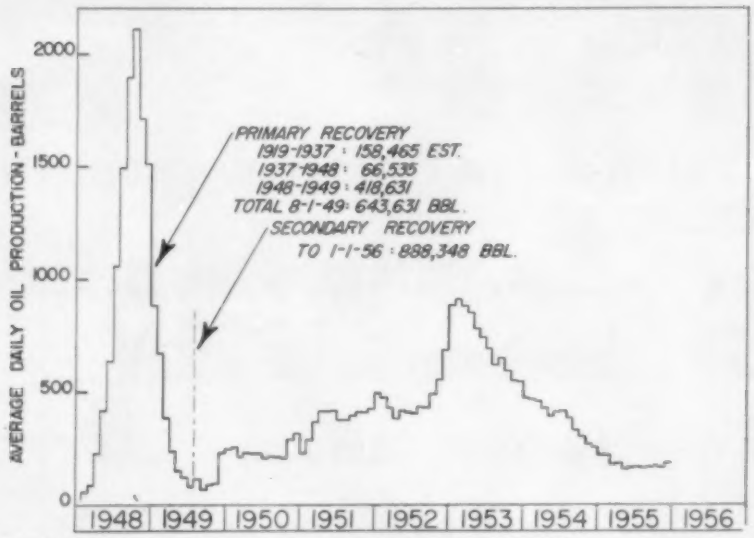
**West Side of Field**
(Unit well No. 104—February 23, 1953)

| Depth (ft.) | Perm. (md.) | Porosity (per cent) | Residual saturation per cent of pore space: Oil | Residual saturation per cent of pore space: Water | Effective section by the core lab. |
|---|---|---|---|---|---|
| 2,825 | 23.0 | 11.7 | 24.8 | 30.8 | Upper |
| 2,816 | 0.1 | 9.0 | 22.2 | 21.2 | Upper |
| 2,826-31 | .... | .... | .... | .... | Tight lime streak |
| 2,831 | 1.3 | 12.7 | 18.9 | 33.8 | Upper |
| 2,832 | 0.4 | 10.4 | 24.0 | 17.3 | Upper |
| 2,833 | 0.1 | 6.8 | 45.6 | 28.0 | Upper |
| 2,834 | 0.1 | 10.4 | 27.9 | 17.3 | Upper |
| 2,835 | 0.1 | 6.3 | 31.8 | 7.9 | Upper |
| 2,835.5 | 0.1 | 1.4 | 50.0 | 42.9 | Upper |
| 2,836 | 0.1 | 1.3 | 30.8 | 46.1 | Upper |
| 2,836-39 | .... | .... | .... | .... | Tight lime streak |
| 2,839 | 0.1 | 4.2 | 40.5 | 40.5 | Lower |
| 2,840 | 0.1 | 6.2 | 29.0 | 14.5 | Lower |
| 2,841 | 1.9 | 13.0 | 31.6 | 25.4 | Lower |
| 2,842 | 0.1 | 9.0 | 33.4 | 44.4 | Lower |
| 2,843 | 0.1 | 7.5 | 32.0 | 14.7 | Lower |
| 2,844 | 5.7 | 10.5 | 35.2 | 17.2 | Lower |
| 2,845 | 0.1 | 6.7 | 37.3 | 23.8 | Lower |
| 2,846 | 0.2 | 12.9 | 31.8 | 35.7 | Lower |
| 2,847 | 0.1 | 8.5 | 37.6 | 14.1 | Lower |
| 2,848 | 0.1 | 6.3 | 11.1 | 22.2 | Lower |
| 2,849 | 0.4 | 3.0 | 53.3 | 26.7 | Lower |
| Core lab. averages | 1.7 | 7.9 | 32.4 | 26.2 | |

Note: From the core lab. on well No. 104: "These analyses were confined to the matrix and did not take into account the effects of the fracture pattern noted. . . . Inasmuch as the fracture pattern is felt sufficient to aid drainage from the tighter matrix, all samples, regardless of permeability, have been used. The validity of the water-drive figure may be subject to question in view of the fractured nature of the tight matrix."




**INJECTION OF WATER produced 1 bbl. of oil for every 7.5 bbl. of water. Fig. 3.**




**SECONDARY OIL recovered by water flooding was 888,348 bbl. compared to only 643,631 bbl. primary production. Fig. 4.**

ft. Total depth of the well was 190 ft.

Calgon was used as a corrosion inhibitor and oil seals were kept on the water-receiving tanks. No filters were used and no plugging of input wells was ever detected, except for one case caused by iron sulfide in the injection lines. This apparently came from the produced water from one well found in the water from the heater treater at one production tank battery.

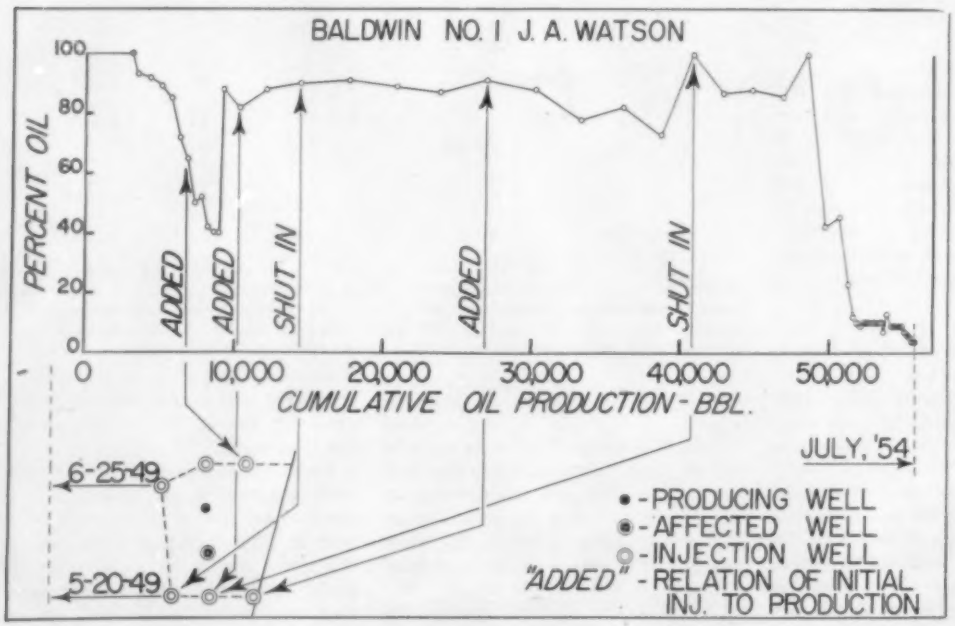
### Effects of Fractures

Fig. 4 shows the production history of the field before and during the water-flooding operations. Total recovery of 1,532,000 bbl. is only 12.8 per cent of the estimated original oil in place.

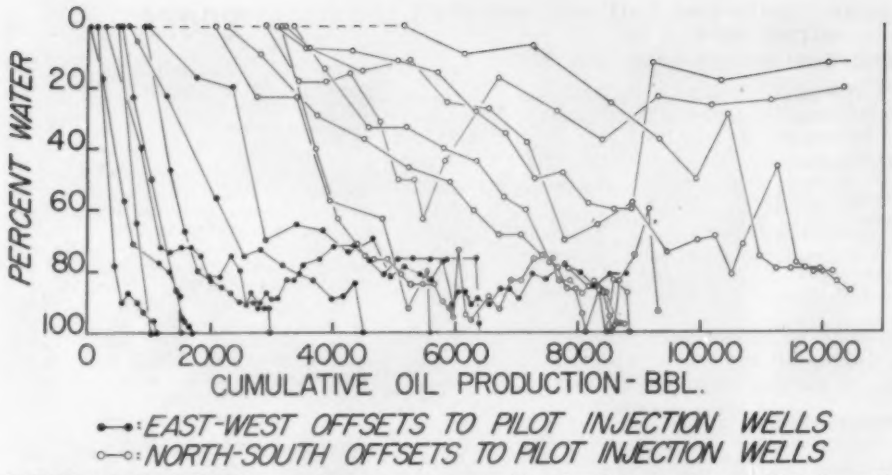
An example of the results to be expected when a well is affected by the fillup and trapping of oil in a particular area by the injected water is shown in Fig. 5. At the end of July 1, 1954, this well had produced 55,799 bbl. since first being affected by water injected and was shut in on account of high water percentage.

The area in which this well is located is surrounded by six water-injection wells which were added at various times to attempt to affect the well's ultimate recovery. The production from the well, when first affected, was never over 40 bbl. of fluid per day. Subsequently to being trapped, the production went to over 100 bbl. of fluid per day with a marked decrease in percentage of water production, as will be noted from the figure.

None of the other wells when first affected produced from areas where the oil was trapped this way, but produced only the oil moved fairly close




**TRAPPING of oil inside a five spot resulted from drilling of new injection wells. Fig. 5.**




**EFFECT OF FRACTURES** was to increase water cut rapidly of wells east and west of injection wells. Fig. 6.

to the well bore because of the low bottom-hole pressures. Similar affects have been pointed out very clearly by George L. Buckles.[2]

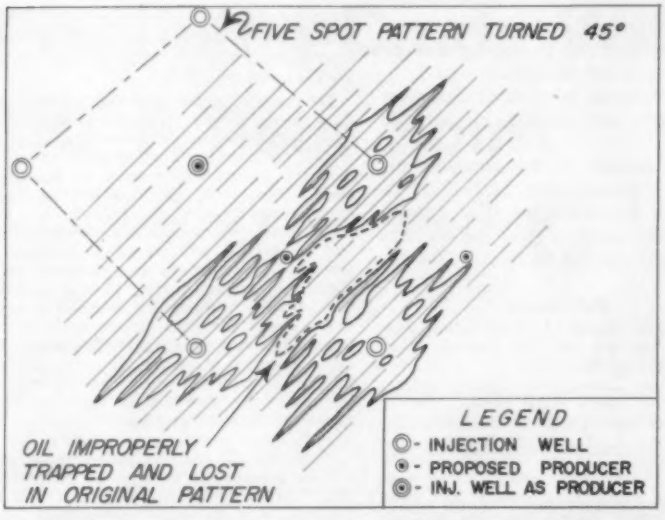
**Fracture pattern . . .** Early in the life of the water flood, a trend of water movement and oil production was noticed which may explain the very low primary recovery in per cent of the original oil in place. This trend is marked by the initial recovery of 2.7 times as much oil from wells located in the north-south and northwest-southeast directions from a water-injection well as the recovery from wells located in the east-west and northeast-southwest directions from a water-injection well. These results have been called the "effect of formation fractures" (see Fig. 6). These recovery volumes were obtained before any effects of trapping inside patterns occurred.

**Placing wells . . .** Fig. 1 shows the five-spot patterns as they appeared on January 1, 1954, although some patterns were not complete at the time. In fact, four of the eight water-flood development wells eventually drilled had not been drilled at this time, and all of the patterns shown here have not been completed.

Most of the oil was produced from the eastern two-thirds and better portion of the field, although most of the current production is now being produced from the western one-third where the producing zone is tighter, the spacing is larger, and development was slower because of having to drill injection or production wells.

At Kirk field, wells at right angles to the fracture system were not affected for relatively long periods after initial injection in the pilot wells. In one case a well 660 ft. south and slightly east of an injection well in which injection was commenced May 20, 1949, was not affected until January 18, 1950. At that time, 119,236 bbl. of water had been injected. The well produced 16,391 bbl. of oil to March 1953. The east offset was affected July 20, 1949, after injection of 11,567 bbl. of water and produced only 1,701 bbl. of oil to January 20, 1950, when it was making 99 per cent water.

The south offset began producing water in April 1950, while the east offset began producing water on August 20, 1949. Other histories were similar.


FIVE SPOT PATTERN TURNED 45°
OIL IMPROPERLY TRAPPED AND LOST IN ORIGINAL PATTERN
LEGEND
- INJECTION WELL
- PROPOSED PRODUCER
- INJ. WELL AS PRODUCER

**BYPASSED OIL** would result in this case where producer and injection wells lie along the fracture pattern: Turning the pattern 45°, avoids bypassing. Fig. 7.

**Requirements . . .** One of the requirements of successfully flooding a fractured reservoir is that you have to inject at pressures such that you end up with oil trapped under enough pressure to get it into the well bore at economical rates, in addition to economical oil percentages. Any injection that sustains any reasonable amount of movement of the injected water will put some pressure on the fluids in the formation, with consequent movement away from the well bore of the injection well.

Fig. 7 shows water-invaded areas in a hypothetical case of water injection into a fractured reservoir. In the actual cases, of course, the fractures are apparently much closer together and the water movement along the fractures may be more extreme than that pictured. Oil will be trapped in the matrix in small isolated areas, depending on the movement of water through the matrix from one fracture to another, for which there would be no remedy.

If the pattern were such that flooding was attempted along the fractures, as shown here, or in a strict line-drive pattern with the proposed producing wells directly on a line between the

**TABLE 2—KIRK FIELD MARBLE FALLS LIME UNIT COST AND GROSS INCOME DATA**

(Barrels oil produced, 888,348, operating cost per barrel, $0.62)

| Date— | Operating expenses | Investment (equipment) | Drilling costs (intangibles) | Total investment incl. dev. |
|---|---|---|---|---|
| 1949 (May-Dec.) | $28,565.26 | $12,165.00 | ..... | $12,165.00 |
| 1950, 1951, and to Sept. 1, 1952 | 228,381.23 | 68,968.31 | ..... | 68,968.31 |
| Sept. 1, 1952-Aug. 31, 1953 | 99,276.61 | 6,590.86 | †$43,248.01 | 49,838.87 |
| Sept. 1, 1953-Dec. 31, 1953 | *32,000.00 | ‖7,500.00 | ..... | 7,500.00 |
| 1954 | 87,094.34 | 3,212.73 | ‡21,409.64 | 24,622.37 |
| 1955 | §72,000.00 | ‖7,500.00 | ¶25,000.00 | 32,500.00 |
| Total | $547,317.44 | $105,936.90 | $89,657.65 | $195,594.55 |

*Four months estimated at $8,000 per month operating expenses. †Unit wells Nos. 104, 105, 106, and 107. ‡Unit wells Nos. 111 and 112. ¶Unit wells Nos. 113 and 114 estimated. §Twelve months estimated at $6,000 per month operating expenses. ‖Estimated.

**Gross Income from Water Flood**

| | Barrels | Operating interests | All interests |
|---|---|---|---|
| Water-flood production: | | | |
| August 1949 to June 1, 1953 | 544,408 | ..... | ..... |
| Operating interest—seven-eighths | 476,420 | ..... | ..... |
| Gross value at $2.65 per barrel | ..... | $1,262,513 | $1,442,681 |
| June 1953 to January 1, 1956 | 343,940 | ..... | ..... |
| Operating interest—seven-eighths | 300,948 | ..... | ..... |
| Gross value at $2.90 per barrel | ..... | 872,750 | 997,426 |
| Total gross value to seven-eighths interest | | $2,135,263 | $2,440,107 |
| Investment | | 195,595 | 195,595 |
| Operating expenses | | 547,317 | 547,317 |
| Gross income to seven-eighths interest (taxes not considered) | | $1,392,351 | $1,697,195 |
| Gross income per $1.00 invested in water-flood development | | $7.12 | $8.68 |

injection wells, large quantities of recoverable oil would be improperly trapped and lost because of early movement of large quantities of water into the proposed producing well. In the hypothetical case the proposed pattern would have to turn 45°, doubling the size of the five-spot area.

Recovery by water flooding of 138 per cent of the volume of oil recovered during the primary phase at Kirk field indicates that oil can be produced from fractured reservoirs by common water-flood action, or conventional water flooding. Hunter[3] describes the water flood at North Burbank where this is being done also. The flood pattern was changed to flood across fractures.

### Water-Flood Costs

Actual investment in water-flooding equipment was only $106,000; however, the costs of eight wells drilled in trying to effectively develop the marginal areas on the southwest edges of the field ran the total investment up to $196,000.

Operating expenses totaled $547,000 or 62 cents per barrel of oil produced. They would probably not have been this high except for the following reasons:

1. Lag in development of the final patterns and consequent lengthening of the life of the project unnecessarily, even after the trend of water movement was noted.

2. Reluctance of the operators to believe that a fracture system existed and production of proposed injection wells unnecessarily, lengthening the life of the project.

3. Continual movement of pumping units around as various wells were affected or went off production due to production of 100 per cent water.

4. Replacement of produced water-gathering lines, flow lines, and water-injection lines due to corrosion from inefficient water treatment.

5. Reluctance to drill development wells until late in the life of the project.

Gross income to the seven-eighths operating interests was $1,392,351 or $7.12 per $1.00 invested. Considering the royalty interests gross income was $1,697,195 or $8.68 per $1.00 invested.

### References


1. Enright, Robert J., "Imbibition Successful," The Oil and Gas Journal, (Mar. 29, 1954), 58, 59.

2. Buckles, George L., "Water-Flooding Pays Off in South Ward Field," The Oil and Gas Journal, (Aug. 9, 1951), 91.

3. Hunter, Z. Z., "North Burbank Unit Water Flood," The Oil and Gas Journal, (Aug. 27, 1956), 86.

4. Ervin, P. S., "Case History: Kirk Field Water-Flooding Project, Eastland and Comanche Counties, Texas," The Oil and Gas Journal, (Feb. 25, 1952).


# BOOKS

OFFICIAL REGISTRY OF RADIO SYSTEMS IN THE INDUSTRIAL SERVICES, 1957. Published by Communication Engineering Book Co., Radio Hill, Monterey, Mass. 152 pp. $5.

This registry lists systems for power-utility, petroleum and gas-pipeline, low-power-industrial, special-industrial, forest-product, relay press and motion picture, and maritime services. It is divided into two parts: Part 1 lists by companies and Part 2 lists by operating frequencies.

This registry is published by permission of the FCC and the data presented have been taken directly from official license files at Washington. Each entry shows: main address, mobile units, fixed transmitters, equipment manufacturer, call letters, and other information.

CONSULTING SERVICES 1957, published by the Association of Consulting Chemists and Chemical Engineers, Inc., 50 East Forty-first Street, New York 17. 136 pp. $1.

This new paper-back book offers directions for finding the right consultant to solve problems of manufacture, process improvements, research and development, plant designs and analytical and testing work in all its modern aspects, etc.

The book is divided into three sections. Section 1, Classifier, contains over 200 items of activity with the members specializing or qualifying in the given field indicated. Section 2, Scope Pages, describes page by page each member's qualifications and activities. Section 3 is an index. This book offers guidance for profitable conduct of business in all branches of industry.

THE PREPARATION OF ENGINEERING REPORTS by Thomas R. Agg and Walter L. Foster. Published by McGraw-Hill Book Co., Inc., New York. 192 pp.

This is a new manual prepared to serve as a guide in the actual writing of engineering reports. Engineers in professional practice who write occasional reports will find this book to be convenient for reference, particularly those parts that deal with the formal report and the sections that discuss punctuation, abbreviations, and style.

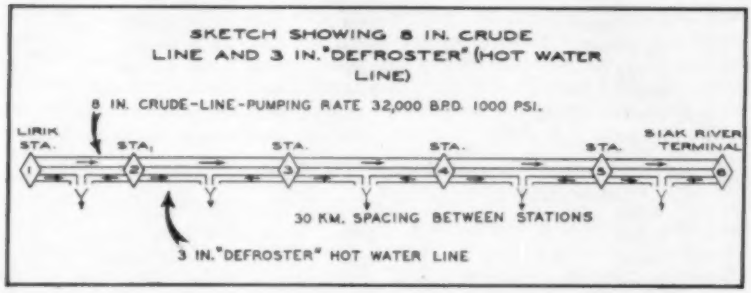
COMMUNICATION THROUGH REPORTS by Paul Douglass. Published by Prentice-Hall, Inc., 70 Fifth Avenue, New York 11. 400 pp. $5.95.

The material in this book is grouped into three main divisions: (1) principles and techniques employed in the development of a report, (2) language fundamentals, and (3) types of reports widely used by management. These three units are tied together by problems involving all of them.

Educators, businessmen, industrialists, and leaders in all professions constantly see the need for better grammar and rhetoric in communication. Here is a book that provides a means for intensive review and a source for quick reference. In functional terms, it summarizes the fundamentals of the language of reports. It warns against pitfalls. It furnishes a compact handbook for use in the settlement of the most frequent, troublesome problems.

Note: The Oil and Gas Journal maintains a book department. Write to the READER SERVICE DEPARTMENT, P. O. Box 1260, Tulsa 1, for copies of the book list. Often books reviewed here may be purchased from this source.

Beneath this 8-in. crude-oil line is a 3-in. defroster line . . .


SKETCH SHOWING 8 IN. CRUDE LINE AND 3 IN. "DEFROSTER" (HOT WATER LINE)
8 IN. CRUDE-LINE-PUMPING RATE 32,000 BPD. 1000 PSI.
LIRIK STA.
STA.
STA.
STA.
STA.
SIAK RIVER TERMINAL
30 KM. SPACING BETWEEN STATIONS
3 IN. "DEFROSTER" HOT WATER LINE

. . . which, with close station spacing, makes possible . . .

# Pipelining Crude With 110° F. Pour Point

By J. M. Rupert and B. N. van Diemen de Jel

PART 2 OF TWO PARTS

THE PIPELINE now under construction was designed with the thought in mind that every possibility of operational difficulties should be considered. Therefore, pumping rates, heating, and station spacing were maintained well within a zone of safety to provide for failure of equipment, human failure, and the effects of adverse weather conditions. The system was also designed to allow for a future increase in throughput rates.

**Part 1 of this article last week discussed pump tests, their results, and conclusions drawn leading to design of Sumatra pipeline for high-pour-point crude. Part 2 covers the design of the crude and defroster line and equipment.**

Several factors limit the design of a pipeline for Lirik crude in addition to its characteristics which are herewith noted:

| | |
|---|---|
| Gravity, °A.P.I. | 34.0 |
| Viscosity | See Fig. 2 |
| Pensky-Martens flash, °F. | 84 |
| Vapor pressure at 100° F., psi. | 1 |
| Pour point, °F. | 105 to 110 |

It has been observed on occasions, when the crude has been heated above 160° F., that some light components are lost, and if excessive heat is applied, coking occurs. Therefore, 155° F. has been selected as the maximum operating temperature.

Experience has shown that while pumping Lirik crude, if the temperature falls below the pour point the pressure along the line drops rapidly. While pumping crude with temperatures below the pour point, it is possible that a shutdown could occur if soil surrounding the pipe was saturated by excessive rain, resulting in an appreciable increase in coefficient "U." The limits on operating temperatures, therefore, are from a minimum of 110° F. to a maximum of 155° F.

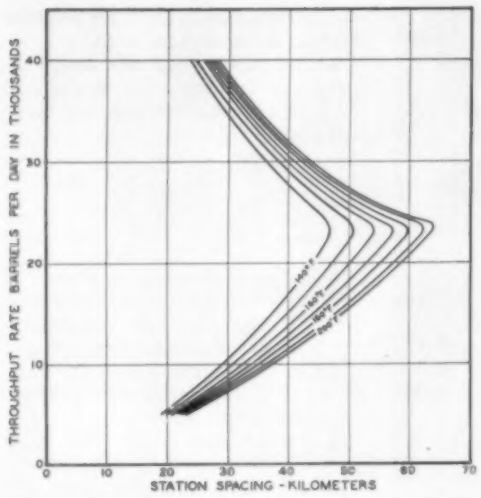
The ground temperature in the Lirik area at 2½ ft. below the surface is 83° F. The soil conductivity throughout the pipeline right-of-way is considered to be fairly constant during the dry season, but can change considerably in some localities during the wet season. While a coefficient of heat transfer from pipe to soil is considered to be 0.8 B.t.u./sq. ft./hr./°F. temperature differential, provision had to be made for safety should the factor "U" increase.

The defroster line is not effective for a distance of 30 km. and is operated as shown on Fig. 6. Hot water is pumped from each pump station to a point halfway between them, reducing the length of defroster line in any section to 15 km.

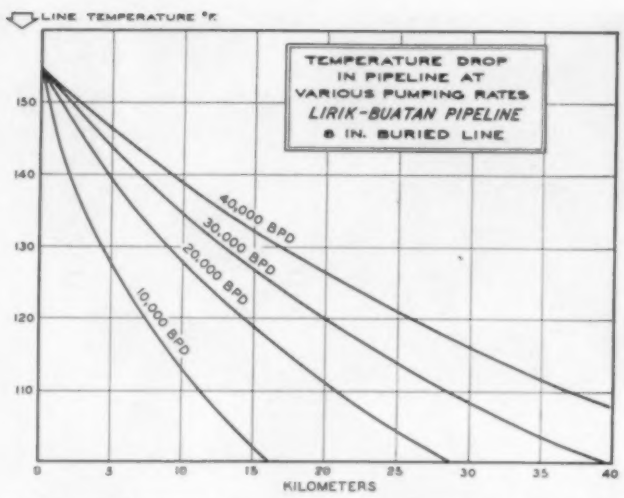
### Pipe Diameters, Station Spacing

Six-inch pipe was first considered for the 150-km. crude line but calculations show that 20,000 bbl. daily can be pumped with 1,000-psi. discharge pressure for slightly over 22 km. With a 6-in. line seven pump stations spaced at 21.4-km. intervals would be required. A 6-in. line with seven pump stations would provide no safety margin in case of emergency and no spare throughput capacity for future increase in throughput rates. The use of a 6-in. pipeline system, therefore, was considered impractical.

The use of 8-in. pipe was then studied. The distances that could be pumped with 1,000 psi. discharge pressure and various initial crude




**STATION SPACING as a function of throughput rate for various initial temperatures for an 8-in. buried line. Fig. 7.**




**TEMPERATURE DROP is shown for various pumping rates with initial crude temperature of 155° F. Highest rates are desirable from standpoint of station spacing. Fig. 8.**

temperatures were calculated. Fig. 7 shows the results of these calculations. The pressure drop was determined for each kilometer of distance; obviously as the temperature drops throughout the line, the viscosity increases and the pressure drop in the last kilometer of distance, naturally, will be greater than the pressure loss in the first kilometer. The curves on Fig. 7 show that, as the velocity decreases below a certain point, the distance that Lirik crude can be pumped decreases rapidly. This is due to temperatures falling below the pour point of the crude throughout an increasing distance of the line.

The temperature of the crude, however, in the last few kilometers of the line starts to fall below the pour point before it becomes apparent by the bends in the curves on Fig. 7.

Fig. 8 shows the temperature drop at various pumping rates with an initial crude temperature of 155° F. This figure illustrates that the highest rates possible are preferable from a standpoint of station spacing. Station spacing is a design for high rates, however, is limited by friction. Fig. 9 shows curve No. 1 which represents the distance Lirik crude can be pumped at various rates before the crude temperature drops below the pour point. Curve No. 2 is the limit of the distance that can be pumped at various rates at 1,000-psi. discharge pressure, due to friction.

Fig. 9 permits the selection of the optimum distance that stations can be spaced and retain a practical margin of safety. Point 0 at the intersection of curves No. 1 and No. 2 is the optimum station spacing for an 8-in. line. The stations can be spaced at intervals of 32 km. The total pipeline

**LIRIK-BUATAN PIPELINE—S.V.P.M.—CENTRAL SUMATRA, INDONESIA—TANKAGE AT PUMPING STATIONS AND BUATAN TERMINAL**

**Station No. 1**

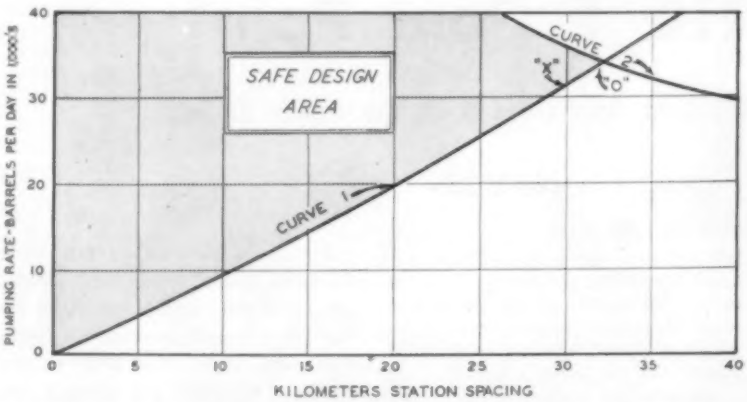
| Quantity | Type | Capacity (bbl.) | Purpose |
|---|---|---|---|
| 1 | All-welded | 55,000 | Lirik crude storage |
| 1 | All-welded | 35,000 | Lirik crude storage |
| 1 | Bolted | 10,000 | Lirik crude storage |
| 1 | Bolted | 5,000 | Defroster water storage |
| 4 | Bolted | 100 | Fuel storage (Lirik crude) |
| 1 | Bolted | 100 | Fuel storage (commercial diesel) |

**Stations Nos. 2, 3, 4, and 5**

| | | | |
|---|---|---|---|
| 1 | Bolted | 10,000 | Surge tank (Lirik crude) |
| 1 | Bolted | 5,000 | Defroster water storage |
| 1 | Bolted | 1,000 | Potable water storage |
| 4 | Bolted | 100 | Fuel storage (Lirik crude) |
| 1 | Bolted | 100 | Fuel storage (commercial diesel) |

**Buatan Terminal**

| | | | |
|---|---|---|---|
| 3 | All-welded | 55,000 | Lirik crude storage |
| 1 | Bolted | 10,000 | Ballast for tankers |
| 1 | Bolted | 1,000 | Potable water storage |
| 4 | Bolted | 100 | Fuel storage (Lirik crude) |
| 1 | Bolted | 100 | Fuel storage (commercial diesel) |
| 1 | Bolted | 5,000 | Defroster water storage |




**LIMITS FOR STATION spacing are shown for 8-in. pipeline with Lirik crude heated to 155° F. and discharge pressure 1,000 psi. Fig. 9.**

**BARGING DOCK at Djapura on Juantan River takes oil from Sago field pipeline for barging to Sungei Gerong refinery near Palembang, Sumatra. Fig. 10.**

**AIRPORT, exemplifying local "batak" architecture, is used for service and supply of Standard-Vacuum's Central Sumatra producing operations. Fig. 11.**

of 150 km. in length would require 150 ÷ 32 or 4.7 pump stations. The five pump stations can be spaced at 150 ÷ 5 or 30-km. intervals and operated at 32,000 bbl. daily as shown by point X.

The pipeline would operate at a 32,000 - bbl. - daily rate on an intermittent basis while pumping conditions were the most difficult during the flood season in order to maintain an average daily production from the field of 20,000 bbl. But during dry weather the line could operate at 20,000 bbl. per day, even though some of the crude in the line had a temperature below the pour point as shown on Fig. 7. The 30-km. station spacing also permits pumping at a rate of approximately 36,000 bbl. daily if increased throughput is desired. Fig. 7 also indicates that during favorable weather conditions an appreciable fuel economy can be effected by reducing the initial crude temperature while pumping at rates below the maximum.

Observations made on the operation of the 2-in. hot-water or "defroster" lines in the experimental test pumping and the Lirik barging project indicated that a 3-in. defroster should be used with the 8-in. pipeline. The hot-water lines are operated only when starting up a line containing congealed crude. When the crude line has been heated sufficiently to allow movement of the crude, the defroster is shut down. The 3-in. defroster is laid under the 8-in. crude line and in contact with the larger line. The defroster is operated at 1,000 psi. discharge pressure and 180° F. initial temperature. The hot water is pumped in each direction from the station to a point halfway between stations. Fig. 6 shows the methods of operating the defroster. It will require from 13 to 19 hours to defrost the 8-in. line, depending upon weather conditions. The crude in the line after a short interruption in pumping does not cool sufficiently to make defrosting necessary. The action of the defroster has more or less the same effect on a line containing congealed crude as solar radiation which was described in the foregoing starting-up tests.

### Equipment

Each station is equipped with four triplex pumps powered by diesels. Each pump has a capacity of slightly under 11,000 bbl. daily. Three units will operate at design capacity and the fourth is a spare. If required, however, the plungers in the pumps can be enlarged and the engines have sufficient horsepower to pump at the maximum rate with three units.

Heat is provided by four 60-hp. oil-field boilers manufactured in the Netherlands. There are three crude-oil heat exchangers and two water heaters.

The pumps for the defroster water are double-acting duplex with diesel engines. Water is also pumped with 10 by 4 by 10 steam pumps.

Electric power is supplied by diesel-electric sets.

All the diesel engines will use Lirik crude as fuel. When units are shut down, however, regular diesel fuel will be run through the fuel lines and fuel pumps in order to avoid plugging them with congealed Lirik crude.

The three Buatan terminal loading pumps are centrifugal with diesel prime movers. The other equipment at the terminal is the same as that installed at the pump stations except for the crude heat exchangers.

All crude-oil storage tanks are provided with heating coils and all crude lines are either steam or hot-water traced.

The tanks at the first station and terminal are all fabricated and welded steel. At the intermediate stations the tanks are the bolted type. All boilers and pumping units are skid-mounted which facilitates their installation.

The communications system is telephonic consisting of three metallic circuits.

All buildings are constructed of units of the same dimensions which allow alterations to be made to a building by adding or dismantling as many units as required.

The domestic water supply is run through filters, and chemicals are added.

Automatic remote-reading tank gages are being installed. Automatic temperature controllers for stock tanks and heat exchangers will be used.

A few remote-control motor valves are being used for tank changing at station No. 1 and the loading terminal.

Automation is being used to an extent that is practical for the operation of the Lirik pipeline system, but full automation such as unattended remote-control pumping stations is not possible.

Most of the labor used on the construction is employed by local contractors handling specific phases of the work. The contractors employ approximately 500 men. Overseas supervisory personnel has been acquired on a loan basis from Socony Mobil and Chicago Bridge & Iron. When the pipeline is in operation, the permanent employes will number approximately 160 to 180, of whom only 4 will be expatriates. **End.**

## BLITZING ALKYLATION PROBLEMS—6

**The Journal's survey of alkylation-unit operations turned up a number of major operating problems and their solutions. In addition, the operators passed along a number of tips to better operation. The bulk of this final installment on alkylation problems is devoted to these tips. Previous installments appeared in Journal issues of March 18, April 8, April 22, and June 3, 1957.**

# Problem: Insufficient Contact in Reactor

**Solution:** Revamp olefin feed system.

**Discussion:** In the tank-type vertical reactors on this unit, olefin feed was added through a side tap on each of 16 internal legs. The feed came into contact with a downcoming circulating emulsion stream and the combined flow carried further downward to mixing jets at the bottom of the legs where agitation took place.

With this arrangement, most of the reaction was taking place between the feed entry port and the mixing jets. The two streams were in contact an average of 8.3 seconds traveling downward through the leg and no intimate mixing took place during this period. The result was a high proportion of side reactions and hence a lowered unit efficiency.

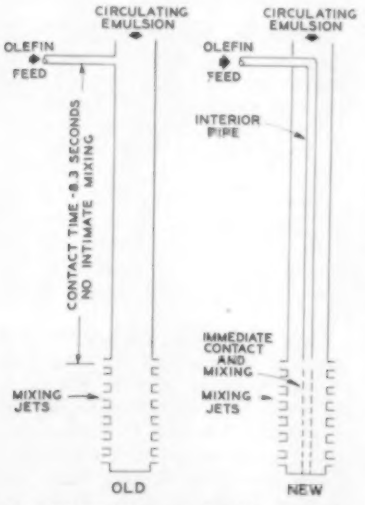
The feed system was modified to provide a separate downcomer pipe for the olefin charge. The pipe was mounted internally within each leg and carried the olefin downward into the mixing jet zone. No contact was made between the olefin and circulating emulsion. The pipe was perforated opposite each mixing jet. There are three jets located at each of several levels in the mixing zone, and these are radially spaced around the leg.

The perforations in the downcomer pipe were made by drilling through the jets into the pipe so that each perforation was on a line with the axis of the circular jet. The downcomer pipe is extra heavy duty, and with this arrangement the emulsion is actually jetted into the pipe to provide a very violent agitation. The reaction thereby takes place with the olefin, isobutane, and emulsion being intimately mixed.

Results of the relatively minor modification are quite graphic:

1. Acid consumption was reduced by 0.28 lb. per gal.
2. At the same time, propylene charge was increased to 16 per cent of total olefin feed, compared to 5 per cent previously.
3. Yield of light alkylate, as per cent of total, was increased by 1.6 per cent.
4. The previous aviation isoplus octane rating was maintained despite the increased propylene feed and 800 bbl. per day more alkylate production.

The comparisons were made on the basis of an 8-month run following the modifications as compared to a similar 8-month run immediately following a previous shutdown.




**OLEFIN FEED reacted with circulating emulsion before the combined stream reached the mixing jets in one unit. Problem was solved by extending feed pipe to the mixing zone.**

# Tips to Better Operations

**By Larry Resen and D. H. Stormont**

IMPROVED sulfuric acid alkylation unit operation can result if operators keep in mind these general hints:

1. **Plastic-coat equipment in acid service.** Phenolic resins applied to the internal housing on pumps, to the pump-shaft sleeves, to plug valves, and to the Duraseal sleeve on the Stratco contactor will solve corrosion problems in these areas. Some items coated this way have given 5 years' service and still are in good condition.
2. **Use Teflon packing with alloy valves.**
3. **Use mechanical seals on acid pumps.** These perform quite well and will eliminate the many leaks inherent with packing glands. External corrosion will also be greatly reduced since leaks will be minimized.
4. **Don't overlook inherent equipment advantages.** For instances, the inlet tube sheet of a chiller was subjected to corrosive and erosive attack. In the process setup, circulating emulsion was discharged from a recycle pump directly into one end of the single-pass chiller.

The discharge tube sheet was undergoing no appreciable attack during its service. The tube bundle was lifted out and reversed so that the outlet tube sheet is at the inlet and vice versa.

5. **Increase steam pressure to obtain better refrigeration with York absorption refrigeration units.** In such a system, ammonia is absorbed in a lean aqua ammonia solution and passed through a stripper where the ammonia is stripped, condensed, and then charged to the chillers. The ammonia vapor from the chillers is returned to the absorbers to be picked up again by the lean aqua solution to begin the cycle again.

Originally, the stripper reboiler was operated using exhaust steam at 10-15-psi. pressure. This has been changed and 80-90-psi. steam is now used. This strips the aqua solution more completely than before.

6. **Maintain acid settlers** at 85 psig. to prevent foaming and emulsion formation. Operation at this pressure has provided troub'e-free performance. At lower pressure a slight increase in vaporization is enough to either sustain an emulsion or start foaming.
7. **Use of high rerun-tower** temperatures will not necessarily cause fouling. Some operators will operate under a vacuum or use lots of steam to avoid fouling. However, this unit operates with an outlet temperature on its reboiler of between 450°-475° F. This particular unit has two towers in its rerun section.

The first tower is equipped with a thermosiphon reboi'er and the second with a gas-fired reboiler. The main alkylate charge is fed to the first tower, where light alkylate is taken overhead. The bottoms from this

REFINING

tower are charged to the second tower and additional light alkylate is taken overhead and heavy alkylate off the bottoms.

The outlet of the gas-fired reboiler is maintained at the indicated temperature merely to get the desired split and not to handle a high charge rate. No live steam is used on either tower.

8. **In charging stock** to the four reactors, two each are operated in parallel and these are then arranged in series with each other. All fresh acid and isobutane recycle is charged to the first two reactors. The olefin feed is split between the two sets of reactors. Effluent from the first set is then charged to the second set where it comes in contact with fresh feed.

While it appears that an even split of olefin feed between the two sets of reactors would be best, in practice approximately 60 per cent is charged to the first set and 40 per cent to the second set. It is easier to control spent-acid strength with a little less olefin in the second set of reactors.

With this arrangement of reactors, alkylate octane rating is the highest obtainable, average acid strength is higher than in straight parallel flow, and acid consumption remains about the same.

9. **Presence of ethylene** in olefin feed will result in abnormally high acid consumption.

## How a West Coast Plant Operates

ONE West Coast operator has three sulfuric acid alky units having a daily capacity of about 6,000 bbl. Stratford contactors are used but remainder of units are plant designed. Experience is as follows:

1. **The company** has experienced no troubles from plugging of the rerun towers.

2. **Corrosion** is not a particular problem. Mild carbon steel is used throughout except as discussed below. Some corrosion is experienced but is not sufficient to interfere with the annual turnaround program.

3. **Acid handling:** Acid of successively decreasing strength is charged to the three units. In first unit the 98 per cent strength is reduced to 95, in second unit the strength is reduced to 92 per cent, and in third unit the acid is discharged at 90 per cent acid strength.

Fresh acid is charged to the plant at approximately a 300-bbl. per day rate. Transfers from unit to unit are made by simplex pumps.

Circulation of acid within a unit is maintained by turbine or motor-driven centrifugals, rated at about 350 g.p.m. Relatively slow pump speeds of about 1,750 r.p.m. are used to protect the outer edge of the impellers from erosion. All centrifugals are equipped for forced-feed lubrication.

In two units the acid is pumped from the settler to the contactor. In the newest unit the settler is "stacked" on the contactor so that the acid gravitates to the contactor. Effluent from the contactors (acid plus hydrocarbons) passes through two acid settlers and then is caustic washed. Type 3-16 steel (18 chrome-8 nickel-2 moly) is used for the caustic injector and in the short mixing section.

From the caustic settler the oil passes through a water wash and the caustic is recirculated. The oil is charged to the fractionation section after the water wash.

**HF unit . . .** One West Coast company operates a 3,700-bbl. alkylation plant using a hydroffuoric acid catalyst. Problems encountered and how they were solved are as follows:

**Contactor corrosion . . .** When built the Stratford contactors were equipped with lance-type tubes. Leaks, which usually occurred at the point where the tubes were rolled into the sheets, led to severe corrosion on the water side at the point of contact with the acid.

Solution was the replacement of the lance-type tubes with U-tubes, and the installation of double tube sheets. Any leaks which occur at the roll, in either the acid or water side, are readily visible.

The same tube setup also was adopted in the acid stripper overhead condenser and in the acid regenerator overhead condenser.

**Regenerator fouling . . .** Corrosion and fouling are continual problems in the acid regenerator but certain practices being followed have about doubled its on-stream time.

Deposits of iron fluoride and scale in the downcomers are the principal trouble. Extremely hard, they are difficult to remove. Attempts to wash the tower with inhibited hydrochloric acid were not too successful.

One measure now being used is to continuously introduce catalytic cracked gas oil into the bottom of the tower, to cut back the heavy polymers which accumulate there. Approximately once a week the acid feed is cut out and while heat is maintained the tower is washed down with this gas-oil stream.

Fluoride deposition and scaling likewise was a problem in the acid stripper. Much better stripping efficiency is being maintained there since the tower was equipped with Uniflux trays fabricated from monel.

**Silica plugging . . .** For some time a serious plugging and corrosion problem existed in the debutanizer condenser, piping, and accumulator pump. Silica dissolved in the upstream bauxite treaters formed a hard, dense scale at these points. Corrosion was severe; spot checks revealed a penetration rate of almost 1 in. per year.

To solve the latter problem an inhibitor (Kontol 91) was injected upstream from the condenser. This resulted in the corrosion rate being dropped to about 0.02 in. per year.

The detergent effect of the inhibitor also has eased the plugging problem. Deposition continues but instead of being hard it now is porous and can readily be flushed out. Effect of inhibitor is believed to preferentially oil-wet the steel surfaces, thereby preventing the silica from bonding to the steel.

Periodic flushing of the system, at approximately 3-month intervals, is required but an 11-month run without pulling the unit down for cleaning has been established.

**Acid handling . . .** A new refrigeration system recently was installed for handling acid materials evacuated from vessels, lines, and pumps in the acid circuit. Its purpose is to increase recoveries of acid and hydrocarbons, and to eliminate air pollution, when any part of the system must be shut down. It is performing quite satisfactorily but has not been in operation long enough for its worth to be accurately judged.

After as much material as possible has been drained out, a vacuum is pulled for several hours. By means of vacuum lines run to several key points in the system, vapors are brought to a shell-and-tube refrigeration unit. Propane is run through the shell side and the acid vapors through the monel U-tube bundle. Through chilling and condensing, acid losses to the neutralizer tower are minimized.

Another interesting point concerns steps taken to prevent centrifugal-pump leakage. Dual mechanical seals are used on all pumps handling acid, with a flushing oil being circulated between the seals to remove heat and to lubricate the seals.

In addition a flushing oil continuously washes the pump throat bushing, thereby keeping acid streams from contacting the inner seal. **End.**

*What you can do about*

# Pressure-Differential Sticking of Drill Pipe

- Spot oil to wet pipe to relieve p.d.
- Reduce hydrostatic head by washing to water
- Best of all, prevent it by using stabilizers and keeping pipe moving as much as possible when opposite permeable formations.

**By W. E. Helmick and A. J. Longley**

PRESENTLY known causes of stuck drill pipe can be listed under the following broad classifications:

1. Foreign objects in the hole, e.g., bit cones.
2. Key seating.
3. Salt-water flows.
4. Formation caving.
5. Pressure-differential sticking.

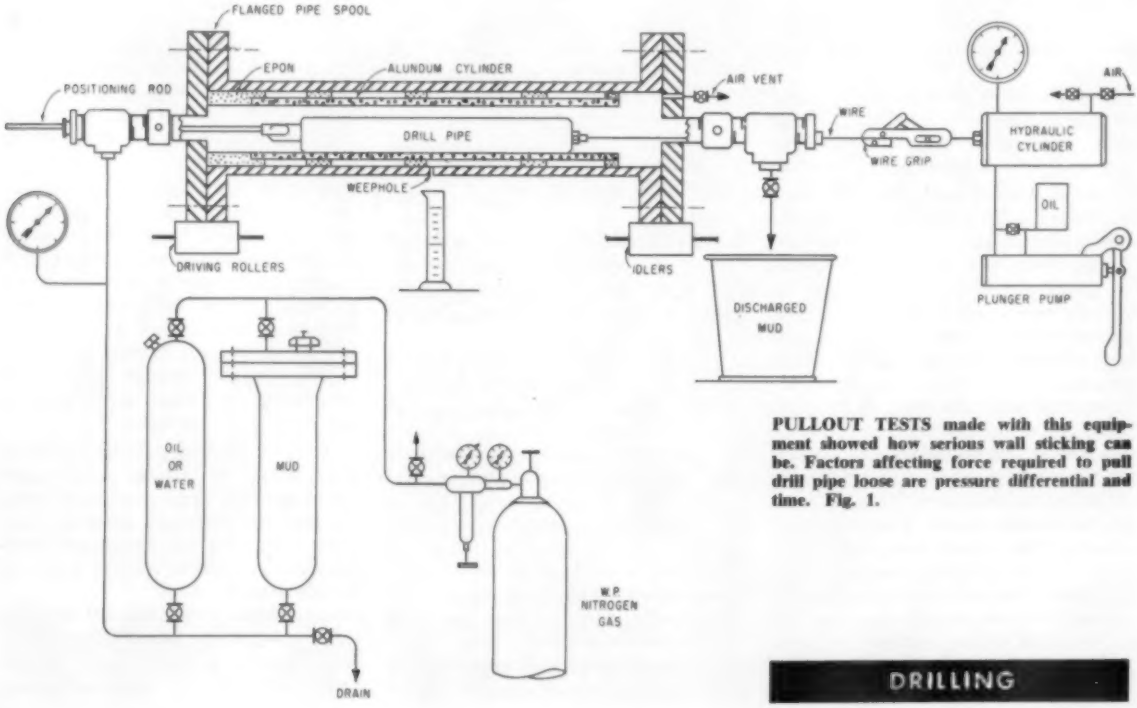
The older literature[1,2] suggested balled-up bits, thick mud cakes, and accumulation of cuttings in washed-out places as major causes but modern muds and bigger pumps have minimized their importance. The purpose of this article is to discuss pressure-differential sticking since it is a new concept. Application of this understanding is already improving operations in many fields.

**How it occurs . . .** The theory of pressure-differential sticking was suggested by C. S. Penfield, then Pacific Coast area drilling superintendent for Shell Oil Co. He noted the spotting of oil would only free pipe that had stuck while remaining motionless opposite a permeable bed.

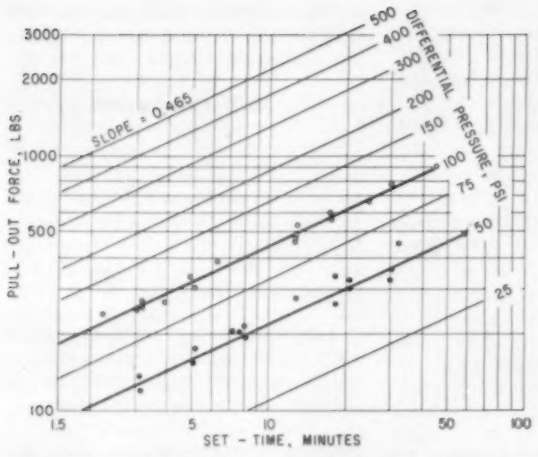
This was particularly noticeable in Brea field, California, where a depleted zone at 4,300 ft. with a pressure gradient of 0.035 psi. per ft. was penetrated in directional holes with muds having hydrostatic gradients of 0.52 psi. per ft. The overbalance was about 2,100 psi.

From these observations it was concluded that the drill collars lay against the filter cake of the low side of the hole. The pressure differential acted against the area of the pipe in contact with the isolated cake with sufficient force that a direct pull could not effect release. The explanation of the freeing of pipe by spotting oil was that the oil acted to equalize the pressure on both sides of the pipe by penetrating between the drill collars and the mud cake by a wetting action.

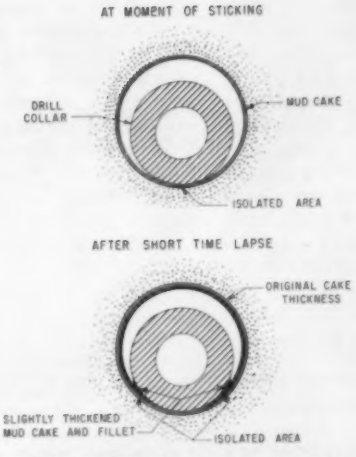
The theory of pressure-differential sticking was questioned, however, because mud cakes have such low per-




**PULLOUT TESTS made with this equipment showed how serious wall sticking can be. Factors affecting force required to pull drill pipe loose are pressure differential and time. Fig. 1.**




**PULLOUT FORCE needed to dislodge pipe is directly proportional to the difference in pressure between hole and formation. The increase with time is roughly proportional to increase of mud cake. Fig. 2.**




**STUCK DRILL PIPE results when it becomes motionless against a permeable bed. After cake buildup, hole pressure presses pipe against wall. Fig. 3.**

meabilities that the pressure drop across the cake should be quite complete. A laboratory investigation was made to study the mechanisms of sticking and freeing of pipe.

### Mechanism of Pressure-Differential Sticking

Test apparatus consisted of equipment with which the following data could be obtained: (1) differential pressure across the mud cake; (2) total filtrate through the simulated permeable section; and (3) the pullout force on the pipe after it became stuck. Fig. 1 is a schematic drawing of the arrangement.

A porous alundum cylinder (4¼-in. o.d. by 3-in. i.d. by 24-in.) was concentrically cemented with epoxy resin in a flanged spool (5⅞-in. o.d. by 30-in. with 12-in. flanges, all tested at 600 psi.) that was mounted horizontally on rollers. To provide circumferential and longitudinal drainage channels between the outer casing and the alundum cylinder after it was cemented, the alundum cylinder was striated with a powdered suger-water paste, the cylinder was cemented in place, the sugar was dissolved, and a "weep" hole was drilled in the center of the spool. Both end flanges were concentrically drilled and tapped for 1½-in. pipe, which connected to 1½-in. swivel joints and forged tees for the mud inlet and outlet connections. Packing glands were placed in the 1½-in. pipe plugs for a ¼-in. positioning rod and a 0.076-in. steel piano pullout wire.

To represent the drill pipe, a piece of 2-in. standard black pipe 18 in. long was used and was filled with mercury to provide bearing pressure. On one end a nut was welded to attach the pullout wire, and on the other end a U-bolt was welded to attach the positioning rod. The wire passed through the packing gland and was attached to the piston rod of the hydraulic cylinder. This arrangement had an ultimate tensile strength of approximately 1,300 lb.

**Operation . . .** Mud was forced into the apparatus from the reservoir by controlled nitrogen-gas pressure. A vent valve was installed on one flange of the spool to bleed off the air so that the apparatus could be completely filled with mud. Limited circulation could be secured by withdrawal of mud from the outlet end of the spool. The filtrate from the mud was collected through the weep hole to determine the rate of filtration. The mud used during the first series of tests had the following characteristics:

**MUD CHARACTERISTICS**

| | |
|---|---|
| Density,* lb. per gal. | 10.5 |
| Stormer viscosity, cp. | 40.5 |
| Initial gel, g. | 65 |
| 10-minute gel, g. | 120 |
| Filtrate loss, cc. A.P.I. | 13.8 |

*79.25 lb. per cu. ft.

Tests were begun by filling the apparatus with mud, setting a constant pressure, and slowly rotating the apparatus for periods of from 30 minutes to 4 hours. During this period of establishing a mud cake, the mud was circulated and the rate of water loss was determined.

Rotation was then stopped and the pipe allowed to stick in the mud cake while circulation continued. The set time from stopping rotation to the pullout was recorded for each test. The rate of water loss was found to be

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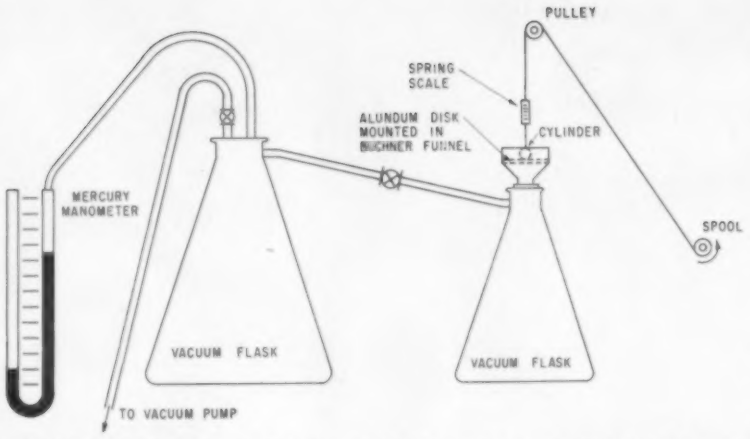
**This paper was presented at the spring meeting of Pacific Coast District of the A.P.I.'s Division of Production, Los Angeles, under the original title, "Pressure-Differential Sticking of Drill Pipe and How It Can Be Avoided or Relieved."**




**THIS MODEL TEST allowed oil to be added to the mud cake to which a cylinder was stuck. Sticking force was found to be due to both differential pressure and steel-to-cake adhesion. Fig. 4.**

almost constant during rotation but decreased slowly when rotation stopped.

The set time was varied from 2 minutes to 1 hour and various pressure differentials were applied. When the predetermined time elapsed, force was applied by slowly increasing the pull on the piano wire. Pressure in the hydraulic cylinder at the instant the pipe pulled loose was recorded and the pullout force was computed.

After each pullout test, the pipe was repositioned, mud was circulated, and rotation was resumed. When the pipe was stopped for the next pullout test, care was taken that its circumferential position was different from the previous test.

**Results . . .** The results of the pullout force and set-time tests at various differential pressures are shown in Fig. 2. The initial tests were run at 50 and 100 psi., and the pullout force vs. set time in minutes were plotted. These points indicated the slope of the best straight-line approximation was 0.465, which is very near the exponent of the time factor in the fundamental filtration equation.

Results of tests at other pressures were then plotted, and the best straight-line approximations parallel to the 50 and 100-psi. lines were drawn. At higher pressures a number of tests encountered pullout forces in excess of the ultimate tensile strength of the equipment and no pullouts were obtained.

**Important observation . . .** Regardless of set time the pullout force always could be lowered by reduction of the differential pressure.

The mechanism of differential sticking is shown in Fig. 3. The ratio of pipe-to-hole diameters affects the initial area of pipe isolated from the hydrostatic pressure and with additional time for continued filtration the isolated area increases. The rate of cake buildup depends upon the filtrate loss of the mud and solids in the mud. It appears, therefore, that occurrences of differential sticking may be decreased by use of low-filtrate-loss, low-solids muds, maintaining the largest ratio of bore hole to pipe diameters practicable in view of other drilling considerations and keeping the periods of pipe at rest as short as possible.

### Mechanism of Release by Spotting Oil

Tests to this point appeared to establish the basis for differential sticking. Testing was continued to study the action of oil in freeing pipe. Extremely erratic results were obtained when oil was spotted in the apparatus, however. The only positive way to free the pipe was found to be the reduction of pressure.

A simpler apparatus was designed, therefore, to analyze the mechanism of release by oil. A diagramatic sketch of the apparatus is shown in Fig. 4. The filtering medium consisted of an alundum disk sealed in a Buchner funnel. Thick-walled steel tubes 2 in. in length and ¾ in. in diameter were used to simulate drill pipe.

Vertical force to pull the drill pipe from the mud cake was applied by a cord spooled in slowly by an electric motor and a spring scale was used to measure the magnitude of this force. With this apparatus, pullout force could be applied to the drill pipe in a uniform manner and the magnitude of the force could be determined at any time.

A vacuum system supplied the pressure differential so that direct observation of the action of oil in freeing the cylinder was possible. The mud used in the tests had the following properties:

**MUD PROPERTIES**

| | |
|---|---|
| Density,* lb. per gal. | 9.8 |
| Plastic viscosity, cp. | 10 |
| Yield point, lb. per 100 sq. ft. | 10 |
| Initial gel, lb. per 100 sq. ft. | 21 |
| 10-minute gel, lb. per 100 sq. ft. | 27 |
| Filtrate loss, cc. A.P.I. | 30.5 |
| Total solids, per cent | 24 |

*73.5 lb. per cu. ft.

The fluid loss was adjusted deliberately to the high value shown because of the comparatively small pressure differential available in the system.

**Sticking measurement . . .** The procedure used to stick the pipe was as follows. Thirty-five milliliters of freshly stirred mud were poured into the Buchner funnel and the vacuum flask was evacuated. After allowing 1 minute for a preliminary mud cake to form, the cylinder was placed horizontally on the mud-covered alundum disk. After an additional 14 minutes of filtration had elapsed, a pullout was attempted.

The first series of tests measured the force required to pull the drill pipe with a pressure differential of 75 cm. mercury (14.5 psi.) across the mud cake. A sufficient number of measurements were made to provide a representative average. Another series was run under the same conditions except that the vacuum was released to remove the differential pressure across the mud cake.

In this way, the force holding the cylinder was divided into two components, one due to the differential pressure across the filter cake and the other due to adhesion of the steel and mud cake. The results are shown in Table 1. It was found that a force of 762 g. (45 per cent) was required to overcome the adhesion of the mud

**TABLE 1—EFFECT OF PRESSURE DIFFERENTIAL ON PULLOUT FORCE**

| Force (g.) required to free cylinder | | Per cent force due to | |
|---|---|---|---|
| 14.5-psi. press. diff. | No press. diff. | Adhesion | Press. diff. |
| 1,650 | 600 | 36 | 64 |
| 1,800 | 1,000 | 56 | 44 |
| 2,000 | 850 | 43 | 57 |
| 1,400 | 800 | 57 | 56 |
| 1,900 | 1,100 | 58 | 42 |
| 1,900 | 675 | 36 | 65 |
| 1,550 | 650 | 42 | 58 |
| 1,400 | 750 | 54 | 47 |
| 1,550 | 650 | 42 | 58 |
| 2,000 | 725 | 36 | 64 |
| 1,550 | 650 | 42 | 58 |
| 1,500 | 725 | 48 | 52 |
| 1,800 | 725 | 40 | 60 |
| 1,692 avg. | 762 avg. | 45 avg. | 55 avg. |

cake to the steel and about 930 g. (55 per cent) required to overcome the pressure differential.

**Freeing with oil . . .** To resolve the mechanism of freeing pipe with oil, a series of tests was run in which two cylinders were stuck simultaneously as described above and with 75 cm. mercury vacuum acting. After the prescribed filtration time had elapsed, one was pulled free. Twenty-five milliliters of kerosine was poured over the cake and the second cylinder was immediately pulled free. These values are shown in Section A of Table 2. On the basis of these tests it appears that oil aided only slightly in freeing pipe.

Another series of tests was run in the same manner except that a period of 5 minutes elapsed between the time the kerosine was added and the pipe was pulled. The results, shown in Section B of Table 2, indicate that in this case oil helped free the pipe and that time was necessary for the kerosine to effect a reduction in the pullout force.

The proper use of oil reduced the force required to overcome the full pressure differential below that reported in Table 1 where no pressure differential existed and oil was not used. Not only was the sticking force due to pressure differential relieved but the adherence of the cake and steel was reduced by the use of oil.

**Unsticking pipe . . .** To more nearly duplicate field procedures, a series of tests was run in which cylinders were stuck in the usual manner and a strain was applied to the pipe. Kerosine was then added and the time required to free the cylinder was observed.

The speed of freeing appeared to depend chiefly on the degree that the oil penetrated and destroyed the bond between the pipe and mud cake. This was evidenced by the shiny, clean surface of the pipe. Further, a minimum amount of cake adhered to the pipe when it was pulled with the use of oil, whereas large amounts of cake stuck to the pipe when oil was not used. It appears that wetting is the principal mechanism that effects the release.

**TABLE 2—EFFECT OF KEROSINE IN FREEING DRILL PIPE**

**A. Force (g.) to loosen cylinder immediately after addition of oil:**

| No oil added | 25 ml. oil added |
|---|---|
| 1,850 | 1,300 |
| 1,800 | 1,450 |
| 2,000 | 1,350 |
| 1,650 | 1,300 |
| 1,600 | 1,800 |
| 2,400 | 1,800 |
| 1,650 | 1,700 |
| 1,600 | 2,000 |
| 1,819 avg. | 1,463 avg. |

**B. Force (g.) to loosen cylinders 5 minutes after addition of oil:**

| No oil added | 25 ml. oil added |
|---|---|
| 1,850 | 400 |
| 1,950 | 500 |
| 1,850 | 275 |
| 1,650 | 450 |
| 1,950 | 500 |
| 1,600 | 550 |
| 1,808 avg. | 446 avg. |

**Use of wetting agents . . .** If wetting is the mechanism of release, the action should be accelerated by making the steel more easily oil-wet. This could be accomplished by two methods: (1) coating the pipe with some material to make the pipe have a greater affinity for oil, or (2) adding an agent to the oil to gain a more positive oil-wetting action.

The first method was tested by coating one of two cylinders with a silicone resin, General Electric's SR-53, and sticking it and the untreated one in the usual way. A force was applied to each cylinder, oil was added, and the time required to pull the pipe free was measured. The results are recorded in Table 3. The average time interval required for freeing the silicone-treated cylinder was about one-third that required for the untreated pipe.

The second method was tested by treating the oil with various additives in an effort to improve the wetting ability of the oil. A sodium lauryl ether sulfate, American Alcolac Corp.'s Sipon, was most effective and reduced the pullout force as shown in Table 4. These treatments confirmed the theory that pipe is freed by wetting when oil is spotted.

The large apparatus was used to confirm the conclusions drawn from tests using the smaller apparatus and agreement was good.

Several interesting observations were made during these confirmation tests. When the pipe was freed with oil, it was completely free and could be repositioned by hand. When freed without the aid of oil, however, a force of about one-half the original pullout force was required to reposition it with no pressure differential acting. This correlated with the percentage earlier determined by use of the small-scale apparatus to be due to adhesion between the steel and cake.

In spotting the oil, it was difficult to displace the mud from around the stuck pipe because of the design of the apparatus. By sticking the pipe, carefully removing the end flange, and gently displacing the mud from the annulus with oil, it was possible to free the pipe as with the small-scale apparatus. This suggested that failure to free pipe by spotting oil in a bore hole is probably also the result of channeling so that the oil does not come in contact with the pipe-mud cake interface.

**TABLE 3—EFFECT OF COATING PIPE WITH SILICONE RESIN**

| Run No. | Time (seconds) for oil to free pipe*: Uncoated cylinder | Coated cylinder |
|---|---|---|
| 1 | 193 | 80 |
| 2 | 225 | (†) |
| 3 | 207 | (†) |
| 4 | 208 | 65 |
| 5 | ... | 78 |
| Average | 208 | 74 |

*500 g. strain. †Did not stick.

## Conclusions and Applications in the Field

In pressure-differential sticking the force that holds the pipe against the wall of the bore hole is proportional to the differential between the hydrostatic and formation fluid pressures. This pressure acts on the area of the pipe in contact with filter cake and isolated from the pressure of the mud in the hole by new filter cake.

The total force required to free the pipe after any given interval of sticking depends upon the rate of increase of the isolated area, which in turn depends upon the pipe-to-hole-diameter ratio and the rate of thickening of the cake. The mechanism of release is reduction of the force on the pipe and may be accomplished by reducing the hydrostatic head or by spotting oil to wet the steel to equalize the differential pressure by restoring the hydrostatic pressure under the pipe.

Application of the theory of differential sticking already has been made to field problems. A number

**TABLE 4—EFFECT OF SIPON ON WETTING ACTION OF OIL IN FREEING STUCK PIPE***

| Run No. | Force (g.) to pull cylinders: Without oil | With oil | With oil plus Sipon |
|---|---|---|---|
| 1 | 1,150 | 400 | 350 |
| 2 | 1,500 | 950 | 400 |
| 3 | 1,850 | 650 | 325 |
| 4 | 1,925 | 450 | 300 |
| 5 | .... | 375 | 400 |
| Average | 1,606 | 605 | 355 |

| Run No. | Time (seconds) to pull cylinders†: Oil | Oil plus Sipon |
|---|---|---|
| 1 | 88 | 48 |
| 2 | 156 | 53 |
| 3 | 97 | 50 |
| Average | 114 | 50 |

*With vacuum acting. †400-g. strain.

of wells in Venezuela and Colombia have been circulated with water to reduce the hydrostatic head and the drill pipe pulled free. Mud programs are being revised in some troublesome areas to use muds with lower densities to decrease pressure differentials and hence the frequency of differential sticking.

**Use of packer . . .** An interesting test was made in Brea field, California, where stuck pipe was backed off and a drill-stem tester (with open-ended drill pipe below it) was run and screwed into the fish. The tester was opened and the release of hydrostatic pressure freed the fish.

Although the fish stuck again during ensuing operations, this experience had far-reaching results. It caused acceptance of the theory of differential sticking and the necessity for keeping the pipe in motion. The resulting careful control of the length of time the pipe is at rest and the use of stabilizers on drill collars have substantially reduced the frequency of differential sticking in this field.

During the 1-year period prior to the packer run, the two company rigs in Brea field experienced at least one occurrence of differential sticking on 6 of 19 wells. During the following year the same two rigs experienced only one occurrence of sticking while drilling 22 wells. Now 18 additional wells have been drilled without a single occurrence of differential sticking.

**Use of oil . . .** If pipe is stuck by differential pressure, several methods may effect a release. Oil may be spotted to wet the pipe. Although inconvenient, application of a coating to the pipe or additions of surface-active agents to the oil may improve the speed of wetting. If spotting oil is unsuccessful due to channeling or failure to reach the critical place in the hole, wells may in some fields be washed to water (or oil) to lower the differential pressure.

Of course, the best method to cure differential sticking is to prevent it. Preventive methods of secondary importance would be use of better muds and the possible reduction of the pipe-to-hole-diameter ratio. But, the two most effective methods found have been the use of drill-collar stabilizers and the use of intensive educational programs. These programs emphasize the importance of conscientiously maintaining the shortest intervals of rest for pipe when opposite permeable formations. Increased awareness of the problem on the part of the crews will produce the same results experienced by Shell at Brea.

**References**


1. Hayward, J. T., "Cause and Cure of Frozen Drill Pipe and Casing," A.P.I. Drilling and Production Practice, 1937, p. 8.
2. Warren, J. E., "Causes, Preventions and Recovery of Stuck Drill Pipe," A.P.I. Drilling and Production Practice, 1940, p. 30.

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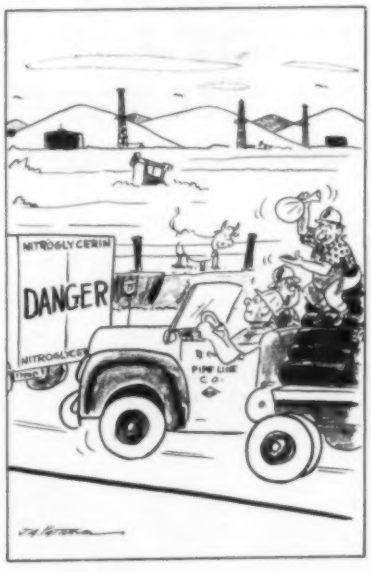


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HIGHLY PORTABLE and accurate gravity meter is a vast improvement over the old cumbersome torsion balance or pendulum, especially in swamp operations where mud and water slow down the work. (Photos courtesy Texas Instruments, Inc.)

# GRAVITY SURVEYS—Faithful, Durable

By Norman S. Morrisey
Drilling-Development Editor

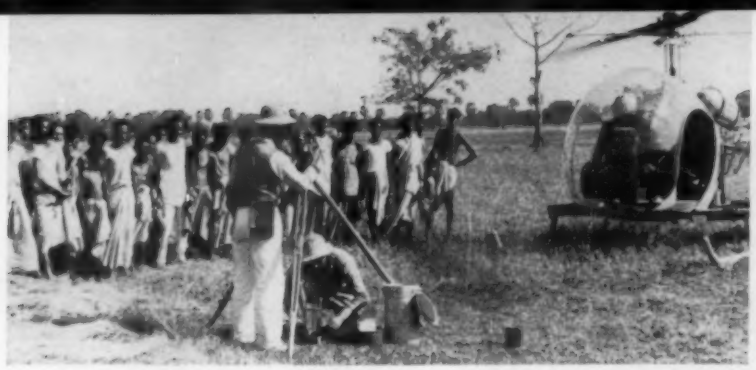
GRAVITY surveys have enjoyed a singular success record along the Gulf Coast. And these surveys are turning up more and more new offshore oil fields. Luckily oil production both on and offshore is associated with salt structures. This type of structure is easily and cheaply mapped by gravity methods. The remarkable success that gravity enjoyed during the early days of geophysics is now being repeated in the quest for offshore oil reserves.

**Sea mounds . . .** Gravity surveys over the large "sea mounds" in the Gulf of Mexico show conclusively that these structures are in reality vast salt domes (Fig. 1). The sea mounds are common on the gulf floor and are found in water depths as great as 600 ft. As a matter of fact, there is a concentration of the sea mounds along the 100-fathom water depth contour in the gulf. These sea mounds or salt domes are evident as hummocks or hills on the ocean floor. Some along the 100-fathom marker will rise to within 100 ft. of the surface of the water. These salt domes may well represent a vast new group of undeveloped oil fields that in time will become as famous as their land counterparts at Spindletop, Jennings, Lake Washington, and Weeks Island.

**Gravity inexpensive but successful . . .** Gravity surveys are inexpensive. Although now looked upon largely as a reconnaissance survey, nearly all large oil fields on the Gulf Coast were first mapped by gravity surveys. Today the gravity survey provides the lead that is then checked with seismic work to find the best spot to drill. The surprising fact is that there are still many untested or inadequately tested gravity leads on land and offshore.

Today the cost of a land survey runs about $6,000 per crew-month with expert interpretations. The usual procedure is to run about two stations per square mile at an average cost of $10 per station. Offshore work is more expensive because of the need for a boat crew, positioning equipment, radio equipment, and underwater gravity meters. An experienced water-borne gravity crew will cost $20,000 per month on the average. During the summer months a water crew will average 500 stations per month. However, production drops sharply during the winter when bad weather hampers operations. Then a crew will do well to turn in 200 stations per month.

Water-borne operations are usually of a reconnaissance nature with stations 1 mile apart and 2 miles between lines. Once a lead is uncovered it is detailed with blanket coverage.



Helicopters speed up gravity work in East Pakistan . . .

and are a real asset in northern Canada's muskeg country.
(Photos courtesy Geophysical Service, Inc.)

# Tool for Oil Finding

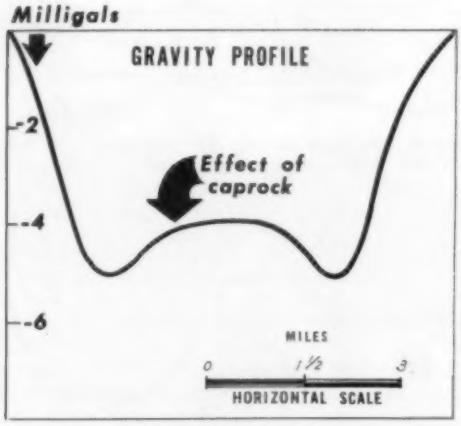
Offshore exploration has given fresh vigor to this now middle-aged oil-finding method. Salt structures are economically and easily mapped

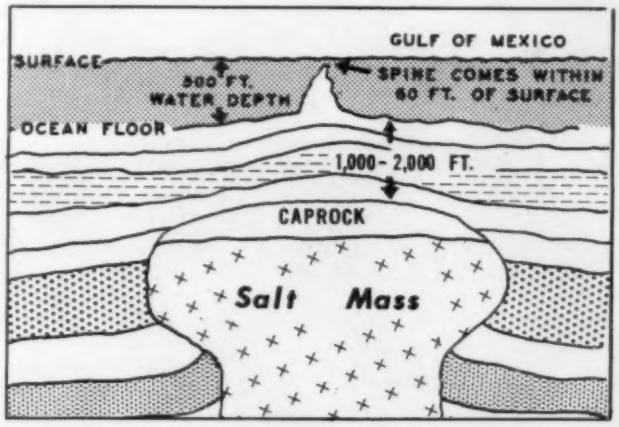
Helicopters are well suited for marsh operations where elevations are no problem. Here this type of survey is even faster than normal methods, and is cheaper in the long run. For example, a recent helicopter gravity survey in the swamp area surveyed 250 sq. miles in 52 days' total time at an average cost of $30 per station. The 1,027 stations were run in 31 working days, averaging 33 stations per day. Best day's performance was 57 stations.

Along the Gulf Coast money invested in gravity work is a sound investment. Grand Isle, Block 18, is a prolific offshore field that was isolated with 6 days of field work. Conservative estimates are that the field will ultimately produce at least 25 million barrels of oil.

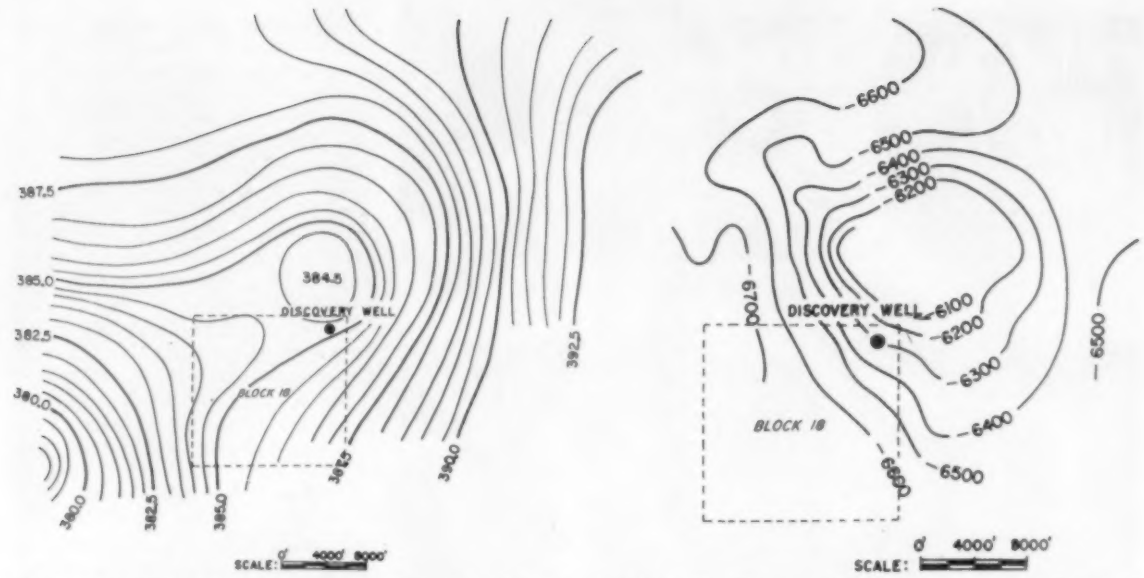
**Combined surveys . . .** Gravity is often used in conjunction with magnetic work to evaluate new oil provinces. Much of this work is concentrated in foreign areas where a fast, inexpensive method is needed. Geophysicists combine the two methods, gravity and magnetic, to determine the size and shape of a structural basin and to work out much of the regional geology. Then it is an easy matter to isolate the areas which should have the greatest oil potential.

Today in both South Louisiana and in foreign work the helicopter speeds up gravity work. New, small, highly accurate gravity meters are available that are used successfully in airborne surveys. Actually the title airborne surveys is a misnomer because the helicopter simply carries the geophysicist and the gravity meter from one station to the next. The helicopter lands in the marshes and the geo-

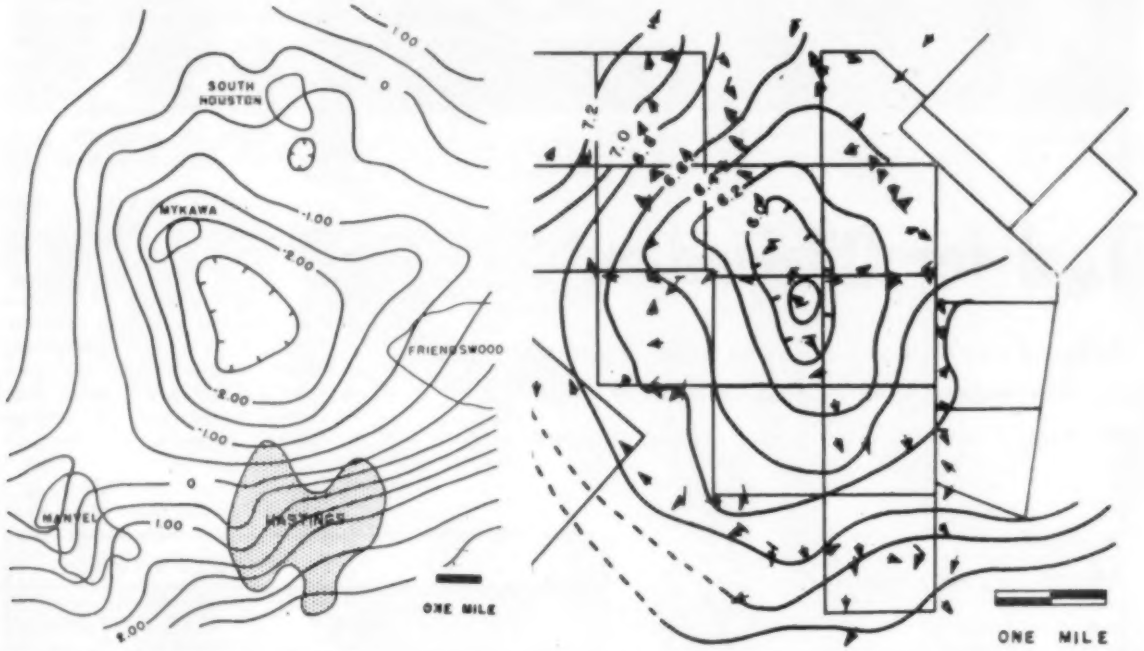



GRAVITY SURVEYS (left) over the "sea mounds" (right) show that these features are actually large salt domes, some of them several miles in diameter. These mounds are found in the Gulf of Mexico from near shore to water depths of 600 ft. Fig. 1.




**GRAVITY SURVEY (left) agrees very well with the detailed seismic map (right). The discovery well penetrated the salt on the Grand Isle, Black 18 dome (Markley, Leo A., Geophysical Case Histories, Vol. 2, p. 103-112). Fig. 2.**




**THE HASTINGS GRAVITY ANOMALY was nearly obscured by the neighboring features (map at left). The residual gravity map, right, however, shows a pronounced lead that was confirmed by seismic work and later drilling. (Weingartner, Russell A., Geophysical Case Histories, Vol. 2, p. 156-168). Fig. 3.**

physicist lowers the instrument to the ground. After he levels the gravity meter, it is a simple matter to take the reading, retrieve the instrument, and fly on to the next station.

### Gravity Successes

The first successful gravity instrument for finding oil-bearing structures was the torsion balance, and European scientists were the first to recognize the torsion balance's commercial application. Actually in 1901 R. von Eotvos successfully used the torsion balance to map lake bottoms. The lake bottom had been mapped by depth soundings, so it was a simple matter to check the calculated depths based on the torsion-balance survey. The gravity meter survey was made in the winter on the frozen lake. The calculated and actual depths were in close agreement. Hugo von Boeckh recognized the possibility of using the torsion balance to map oil structures in 1917. Boeckh carried out surveys over some of the salt domes in Hungary. In the same year, 1917, W. Schweyder mapped a known salt dome and oil field in north Germany.

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| PROPERTY | UNIT | COORS Vitrified High Strength Ceramic TYPE AD-2 |
|---|---|---|
| Tensile Strength | psi | 17,000 - 18,000 |
| Compressive Strength | psi | over 200,000 |
| Flexural Strength | psi | 42,000 - 45,000 |
| Specific Gravity | | 3.40 |
| Hardness | Mohs Scale | 9 |
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| Closest Machined Tolerances | inches | 0.000020 |

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*Manufacturers of High Strength Alumina Ceramics*

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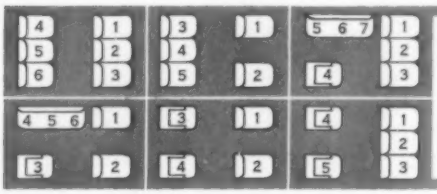
For a demonstration ride and operating facts about the Twin-Bonanza, and the finest financing plans in aviation, see your Beechcraft distributor or dealer, or write Beech Aircraft Corporation, Wichita 1, Kansas.

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Unexcelled comfort is yours in the beautifully styled interiors of the Twin-Bonanza. Choose from six seating arrangements, illustrated at the left.

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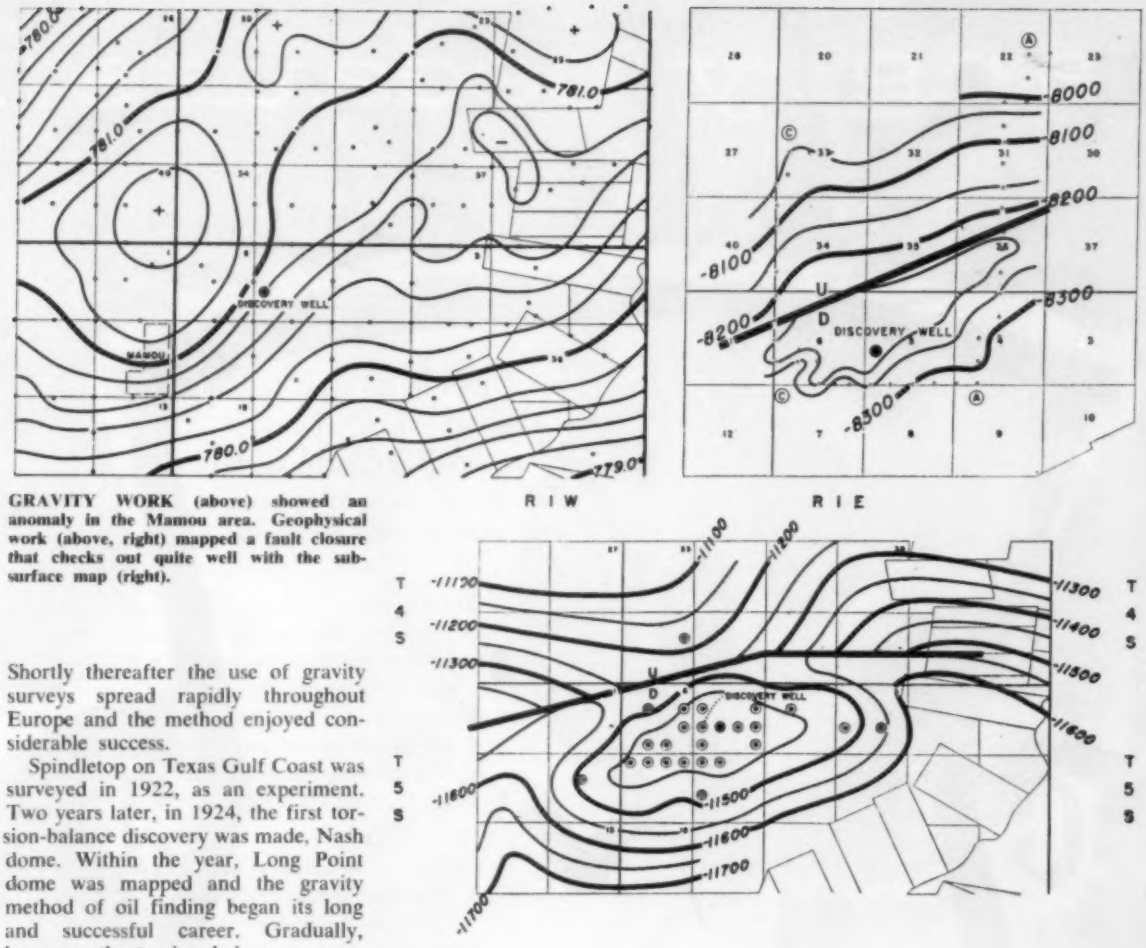


**GRAVITY WORK (above) showed an anomaly in the Mamou area. Geophysical work (above, right) mapped a fault closure that checks out quite well with the subsurface map (right).**

Shortly thereafter the use of gravity surveys spread rapidly throughout Europe and the method enjoyed considerable success.

Spindletop on Texas Gulf Coast was surveyed in 1922, as an experiment. Two years later, in 1924, the first torsion-balance discovery was made, Nash dome. Within the year, Long Point dome was mapped and the gravity method of oil finding began its long and successful career. Gradually, however, the torsion balance was replaced by the pendulum. This, in turn, was superseded by the gravity meter. Today the gravity meter, considerably refined of course, is the accepted method of finding salt domes in reconnaissance work. Invariably the gravity survey is checked with seismic work and the combination of the two makes an unbeatable team in offshore exploration today along Louisiana's Miocene trend.

**Grand Isle, Block 18 . . .** Discovered in 1948, Block 18 now has estimated reserves in excess of 20 million barrels and has already produced 5.5 million barrels of oil. There were 26 wells producing in the field on January 1, 1957. Each well should produce ultimately 1 million barrels of oil, according to published figures. As a matter of fact, the discovery well logged 147 ft. of net oil sand in an area where ultimate recoveries normally are on the order of 800 barrels per acre-foot of net pay. Using these figures, Block 18 field could ultimately produce in excess of 110,000 bbl. per acre.

And 23 gravity stations outlined the original lead in about 1 week's time!

The initial gravity survey (Fig. 2-A) was commenced March 1946 in the Grand Isle area, just off the coast of Louisiana, about 55 miles south of New Orleans. Block 18 lies only 15 miles southeast of Lake Washington field, a piercement salt dome and a major oil field.

The lead was quickly checked with a seismic survey (Fig. 2-B). This work confirmed the gravity lead and mapped a salt dome with a closure of 1,500 ft. on a reflecting horizon at 9,000 ft. Humble Oil & Refining Co. carried out this work, and purchased leases on the strength of the reconnaissance surveys. Additional detailed seismic work and electrical surveys led to the drilling of the discovery well. This well entered the salt at 7,610 ft. and Humble was forced to sidetrack the hole to find the producing sands.

Subsequent drilling has confirmed the original gravity work and the later seismic and electric geophysical surveys.

**Hastings . . .** The original gravity lead at Hastings was almost completely obscured by several larger features (Fig. 3-A). However, the lead became apparent when the surrounding structures and the regional gravity effects were eliminated (Fig. 3-B). The original gravity work was a torsion-balance survey carried out in September 1933 by Stanolind Oil & Gas Co., now Pan American Petroleum Corp. Acreage was purchased on the strength of this survey and interpretation. A seismic survey required only 1 week's work to confirm the gravity lead. Since the drilling of the discovery well, Hastings has developed into one of the largest oil fields on Texas Gulf Coast. It has produced 276 million barrels since its discovery and will ultimately produce over a half a billion barrels of oil.

**Mamou . . .** Production at Mamou is controlled by a fault with the oil field lying on the downthrown or coastal side. The field lies along the north edge of Louisiana's Frio trend and the south edge of the Wilcox

angry because...

# he didn't

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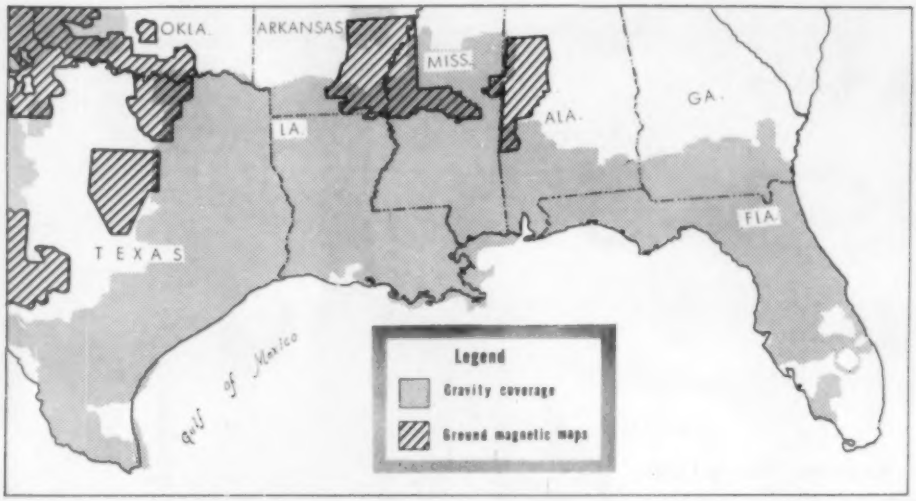


**BOTH gravity and magnetic work are available over a large part of the United States. Cost is nominal when compared to the cost of the original work. (Courtesy Edgar Tobin Aerial Surveys).**

trend. Production is from three sands in the Wilcox section.

Although the Mamou area had been checked with a refraction survey in 1926, several gravity surveys were responsible for the outlining of the Mamou lead. A gravity-meter survey carried out in 1943 mapped an anomaly that encouraged Magnolia Petroleum Corp. to purchase leases (Fig. 4-A). Detailed seismic work mapped a closure at Wilcox level with north dip into an east-west-trending fault (Fig. 4-B). The original seismic work indicated unusual conditions and led to the detailing of the structure. The discovery well was completed in December 1945. The subsurface control (Fig. 4-C) confirmed the gravity and seismic work.

**Gravity coverage available . . .** Blanket gravity coverage of the entire Gulf Coast is now available (Fig. 5). Major oil companies long considered geophysical work like this as highly confidential. Now, however, this gravity coverage can be purchased at a fairly low cost. Generally speaking, the gravity coverage is sold in units of 1,000 sq. miles or a county. The coverage is not confined to the Gulf Coast alone, but extends into West Texas, the Panhandle area, and parts of both the Mid-Continent and the Rocky Mountains.

Here's how this gravity coverage service works:

In 1954 several of the major oil companies agreed to enter into a participating exchange of gravimeter surveys through Edgar Tobin Aerial Surveys, San Antonio. The participating companies submitted to Tobin indexes showing the area of coverage they were willing to release.

Each participating company acquires a credit with each sale of its gravity which is redeemable in purchase of gravity from any other participating company.

All gravity exchanged is furnished on base maps at a scale of 1 in. equals 4,000 ft. or 1 in. equals 8,000 ft. All gravity sales are made subsequent to the purchase of base maps of the area involved. The cost of the gravity is on a per station cost and may be purchased on a long term-no interest payment plan. The average cost is $2 per station with the exception of some offshore stations which will run higher.

Upon request of an area of interest, Tobin will furnish an index indicating the density and pattern of the stations. A company may purchase gravity without participating in an exchange. The present gravity available exceeds 200,000 sq. miles.

Over 100,000 sq. miles of airborne and ground magnetic surveys are also available. These maps are sold in the same manner as the gravity surveys with the exception that the cost is estimated on a square-mile basis of $2 per mile.

**Acknowledgment . . .** Many of the data on the three geophysical case histories was obtained from Volume 2, Geophysical Case Histories, published by Society of Exploration Geophysicists.

**OFFSHORE gravity crew under way. Gravity meter dangles from small crane at starboard. Instrument is lowered to bottom, leveled by remote control, and reading is registered on a remote-control instrument aboard boat. (Courtesy S.E.G.)**

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**A new instrument designed to facilitate more accurate interpretation of seismic recordings.**

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When used in conjunction with SSC's Seismic Replay Console and Visual Display Unit, or similar equipment, the CMF Camera will present a cross-section of multiple traces, corrected for weathering, elevation, and normal step-out. These variable density cross-sections are very useful for the rapid appraisal of geologic structure. Critical detail can be confirmed by conventional computing methods.

Write or call (collect) and request specification sheets on the CMF Camera and information concerning SSC's Seismic Replay Center.

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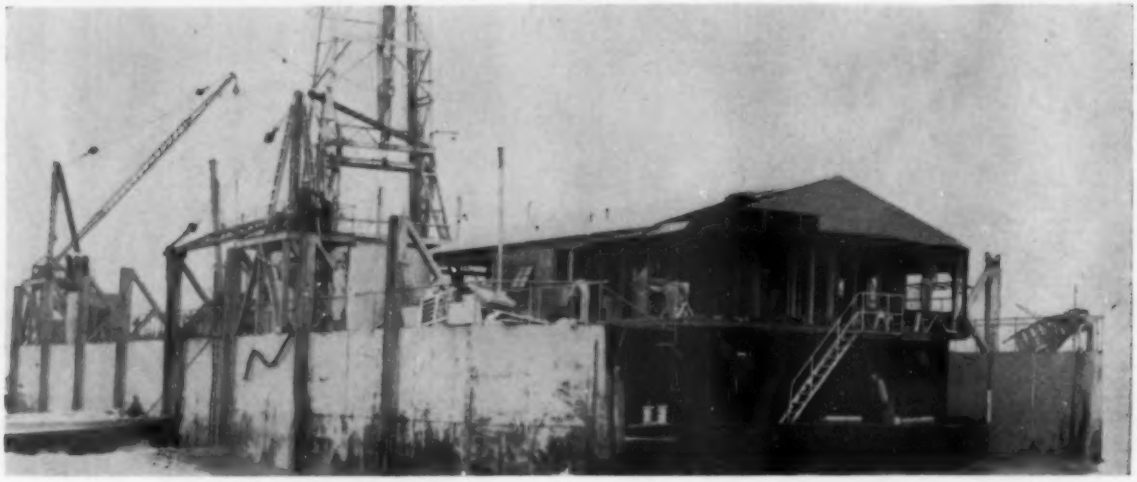

Such scenes as this may be avoided in the future, if operators will remember . . .

# What Terrible-Tempered Flossie Taught

That 1956 hurricane wreaked havoc as it roared down on the lower Mississippi Delta area. But some lessons were learned about how to live with such a blow and have drilling operations survive.

**By J. R. Graham and J. E. Pike**

ON THE afternoon and evening of September 29, 1956, it became evident that Hurricane Flossie was going to sideswipe the lower Mississippi Delta area. But that time, it was too late for many of the drilling crews and other personnel in the Grand Isle and Mississippi Delta areas to do much but shut down the rigs and run. It is only natural that the prime concern of any drilling superintendent is in the drilling and producing of an oil well. These wells are extremely expensive to drill. And once the operation is started, it should not be disrupted or stopped for any reason until the well is completed. Therefore, in the offshore drilling industry it is often found that the responsible personnel in charge of the operation will disregard personal safety and the safety of the marine equipment in attempting to safeguard the drilling operation.

If you can understand the psychology and thinking of these men, you can understand that they would not leave the rigs, before Hurricane Flossie, until the actions of the sea actually became violent. This area is a very prolific producer of oil and gas; and there were many drilling rigs, tenders, crew boats, and barges affected. It would be impossible to mention all, or even a large portion, of the casualties which occurred. Several instances are known of where barges on the inland waterways were deposited several hundred yards inland. In some cases the barges have not yet been found.

Of particular interest to this group are the factors to be learned from the effect of hurricane action on that equipment which was unprotected and at or near the center of the hurricane. Many mistakes have been made in design, and mistakes were made in the handling of the equipment at the approach of the hurricane. It is believed that it is important for the designers, builders, and operators of such equipment to know what has been learned as a result of this experience. Those who have had close association with tanker people or the oil industries in general, know of the great competition between the major companies. This applies to the offshore drilling industry as well. But after Hurricane Flossie, there were many instances of exceptional cooperation in assisting each other in salvage operations, rescue of personnel, and other like matters.

**Carter-Mart experience . . .** Our firm was most closely associated with a submersible drilling barge, the Carter-Mart, owned by Morris & Hamilton Co., of Houston. Personnel were immediately dispatched after the hurricane for salvage operations to the rig. The submersible barge, 230 ft. long by 99 ft. wide, was a new barge and

Authors are, respectively, with Christensen & Graham, Inc., Pasadena, Tex., and Langham, Langston & Burnett, Houston. Paper presented at meeting of A.P.I. Division of Production, Southern District, Shreveport, under the original title, "Hurricane Flossie—Knowledge and Experience Gained for Offshore Drilling Equipment."

# Sour crudes won't corrode this pipe

## Oil industry uses Tenite Butyrate plastic pipe for trouble-free service

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But this pipe has other unique advantages too. It is amazingly light in weight; a 20′ length of 4″ pipe weighs only 20 lbs. Its glass-smooth walls resist paraffin accumulation; cleaning shutdowns are virtually eliminated. This smoothness also provides as much as 40% greater flow volume for any given head loss than does clean metal pipe of the same diameter. Rapid joining is accomplished with slip-sleeve couplings and solvent cement.

Why not find out more about pipe of Tenite Butyrate? Perhaps you can take advantage of the benefits that this pipe is providing to so many others in the petroleum industry.

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*A 16-mm. sound-color film, "PLASTIC PIPELINES," is available upon request.*

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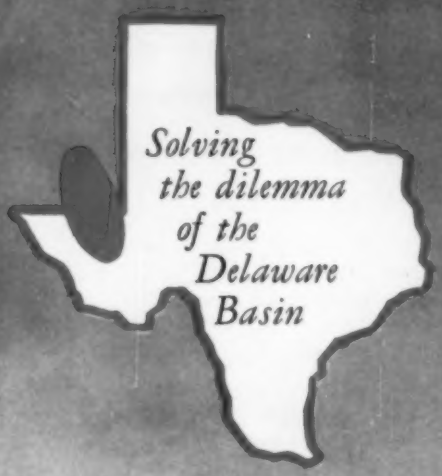
*an Eastman plastic*




# SHOOT THE DELAWARE BASIN?

From the standpoint of seismic prospecting, the Delaware Basin has always fallen under the category of a "poor" to "no-record" area. As a result, much of it remains unexplored.

Now, GSI research and experimentation has paid off in a method which produces workable records in most areas of the Delaware Basin . . . and at a considerable saving in exploration dollars.

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*A World of Experience in Finding a World of Oil*

was drilling its first well due south of Cocodrie, La., on the west side of Timbalier Island. The barge had been originally submerged before the hurricane in 25 ft. of water. This particular barge is submerged one end at a time, had successfully completed trials, and had been located in a north-south direction.

Prior to locating the barge, The Texas Co. had erected a four-legged square template jacket to protect the well during and after drilling. The location of this particular oil field had been well established so it was reasonably assumed that a producing well would be brought in. In some cases such template jackets are built after the well has been drilled. In this case the template was erected first. It then became necessary to locate the barge directly over the jacket. In any kind of weather at all this is a very difficult thing to do; and it was suggested that where such jackets must be installed before the well is drilled, the jackets be so designed that the drilling structure need only be located to reasonable accuracy and the conductor pipe driven after the drilling rig has been set in place.

Hurricane Flossie hit on the evening of September 29. In this particular case, all personnel were safely evacuated by boat after the load line of the rig mast had been secured to the conductor pipe of the well at a tension of approximately 20 tons. At this time a hole had been drilled to a depth of about 7,000 ft. In shallow water, wave action against a submerged hull is of high intensity. Further, the bottom in this area is very soft. High wind and wave action lasted approximately 30 hours. The barge was fully ballasted and had a reasonably heavy cargo topside of drilling mud and cement. The approximate weight of the rig was 6,850 tons with a displacement of the lower hull and columns of 4,600 tons, making the total supported weight on the bottom of 2,250 tons. The average bottom bearing pressure of the barge at the time of the hurricane was 280 lb. per sq. ft. This is generally considered to be acceptable in the soft bottom conditions of the delta. During the hurricane, wave action against the lower hull caused it to swing around the wellhead approximately 120°. The template jacket was badly damaged; and inasmuch as the slot end of the barge was of less width than the diagonal of the template jacket, something had to give when the barge passed through about 45°. Further, the barge moved approximately 40 ft. away from the center of the well. Such action, plus the vertical pound-

## *The authors conclude . . .*

● The submersible type of barge, which is economical to build and is quite safe in reasonably shallow water, up to say 40 ft. will walk on the bottom in heavy storm conditions unless it is tied in place with piling or by spuds driven into the bottom. It is our opinion that all such barges should have a spudding or piling arrangement to prevent the movement of the barge during storms.

● The damage to the "Carter-Mart" was the cause of a near disaster. It is recommended that such slotted barges operating in the open seas be built with cofferdams around the slot so that, in the event of contact or damage between the barge and the jacket structure, this damage cannot be of serious consequence.

● Communication systems must be of the finest quality and should include contact between all stations, shore bases, Weather Bureau, tugboats and other marine equipment.

● We question the advisability of any connection between the wellhead and the structure during a storm. From what we have seen, we believe it is probably a better practice if no connection exists between the two if it becomes necessary for the crew to abandon the rig.

● There has been much damage caused by floating objects, vessels, barges, and other craft as a result of inadequate fender systems or mooring systems against the structures. After studying practically all of the offshore equipment, we are of the opinion that there has been no satisfactory fender system developed, and that the safest means is to anchor the floating equipment adjacent to the structure, but not in contact with it.

● This will come as no surprise to anybody, but self-propelled equipment is considerably safer in storm conditions than is non-propelled equipment. Further, when a storm develops, everyone wants a tugboat and confusion is widespread.

● It is estimated that approximately one-third of the total oil reserves in the United States are out in the Gulf of Mexico. To date, little production of these reserves has been established. What is happening is that the drilling contractors and producing companies are locating their fields. We anticipate that in the next 5 years there will be a trend toward production, underwater pipelines will be established, collection and processing stations will be greatly increased. Structures are now being built in 100 ft. of water. The Coast Guard has established reasonable rules for certain features of lighting, foghorns, and other communications to protect the platforms from shipping. However, as these structures are erected farther from shore, the communications between drilling and producing structures and shipping will have to be improved. It must be borne in mind that one well in, say, 100 ft. of water, represents an expenditure of approximately 1 million dollars. The productivity of that well may reach 10 million dollars or more. Therefore, there is not only a condition hazardous to navigation, but there is also a considerable financial risk to both the shipping and petroleum people.

Our experience in the offshore industry has been extremely interesting and informative. Many problems have not been resolved and I do not believe anyone can properly claim to be an expert in this field. We are all learning and hope to profit by our experiences. It is quite possible that a new drilling technique will be developed which will allow drilling and producing from underwater stations or from floating structures. I believe, however, that we can be assured that the future years will see a tremendous development in the production of petroleum products in the Gulf of Mexico.

**EXAMPLE of effect of the hurricane storm on deck cargo which was not tied down. These are oil drums on the deck of the K. S. Adams.**

**CONDUCTOR PIPE which was broken off by wave action. Pipe was fractured 50 ft. below water line.**

ing of waves and the fact that the barge was tied over the well casing, caused the barge to dig a hole for herself. After the hurricane, the barge was in a hole at the slot end, and the bottom of the barge was 34 ft. below the surface. There was a list of 1½° and a trim, fore and aft, of 2°. This would not be considered serious for any normal vessel. However, these drilling rigs are not normal marine vessels, and the stability characteristics are such that list and trim cannot be tolerated.

It was suspected that damage to the barge had occurred; but this could not be proved because divers were unable to examine even the sides of the barge, as the deck was practically even with the bottom of the ocean. To make a long story short, 4 rather hectic days were spent in the salvage of the rig; and she was eventually brought to the surface under her own power, repaired, and is now back in operation. The rig had been damaged and severely holed. This condition was not readily apparent. It was impossible to pump out one of the slot-end compartments. The pumping arrangement of this rig is generally adequate and capable of close control as to the level of liquid in each tank. However, tank-level-indicating gages were damaged by the hurricane, and the extent of damage to the tanks was not discovered until it was almost too late. There were two factors involved. First, there was a damaged condition which prevented uniform buoyant forces to a structure with an admittedly low metacentric height. Second, there were no tank-level-indicating gages for the drilling-water tanks. The drilling-water tanks were approximately half full, and the crossover piping and valves were open.

At this point the rig developed a severe list of about 17° and almost capsized. The rig was eventually brought to the surface by a controlled operation of pumping the starboard tank, blowing water out of the port tank with compressed air, and using very accurately calibrated pressure gages for establishing the quantity of water blown out of the port tank.

Kerr-McGee Rigs 40 and 44 were at the same location and 2 or 3 miles distant from the Carter-Mart. These rigs were also abandoned and all men removed safely, but they were not tied down to the conductor pipe. The Kerr-McGee rigs have smaller and lower hulls and exert a higher bottom pressure than the Carter-Mart and were, therefore, a little more resistant to lateral wave forces. What happened in the case of these two rigs was that they settled in the bottom because of their own weight and actually damaged the topside structure by collision with the wellhead.

In all three of the foregoing cases, wells were lost resulting in a loss of several hundred thousand dollars. Under these circumstances the rigs were removed from the location of the well, and the template jacket structure and conductor pipe were removed to at least 6 ft. below the mud line.

**Bay marchand area . . .** The YF Tender "K. S. Adams" was drilling in the Bay Marchand area, Block 4, Phillips' Houston office had been in close contact with weather services. It was decided early Saturday morning to remove the barge from her moorings and tow her in to Terrebonne Bay. As in the case of most drilling tenders, the barge was able to drop her moorings with the assistance of only one small tug boat. The mooring system on this barge consisted of two diagonal anchor chains at bow and stern, and one stern anchor with 1¼-in. chain attached to a 5,000-lb. anchor directly astern of the rig. Anchor piling was 30-in. o.d. by ⅝-in. wall-thickness caissons, driven into the bottom from the surface to bearing then burned off about 6 ft. above the bottom. Usually the contractor who installs the template jacket structure also drives the anchor piling and attaches about three shots of anchor chain to the piling, which is laid out and marked with buoys so that the tender can pick up the end of the anchor chain and attach to the chain on the tender with a Di-Lok connecting link. Breaking loose from the mooring is done in the reverse manner as the tender is jockeyed around in position with its own mooring winches.

The tug available at the scene was not of sufficient power to handle the barge as the wind and seas began to increase. A second tug was dispatched from Morgan City, but arrived too late to tow the barge to protected waters before the full force of the hurricane was upon them. The tugs and barge rode out the seas on Saturday night but made little or no progress. On Sunday morning the tow line parted, and by Sunday afternoon the barge was beached by the seas on Wyne Island. A full crew was aboard, and the crew was not removed until the seas abated Monday morning. Salvage operations were greatly simplified because the barge at the time of the storm was heavily loaded with fuel oil, drilling water, and pipe and tubing. By removing this cargo after the storm, it was relatively easy to pull the barge off the beach.

Normal procedure in handling a tender in storm conditions is to drop the mooring chain or wire rope and let the tender swing on the stern

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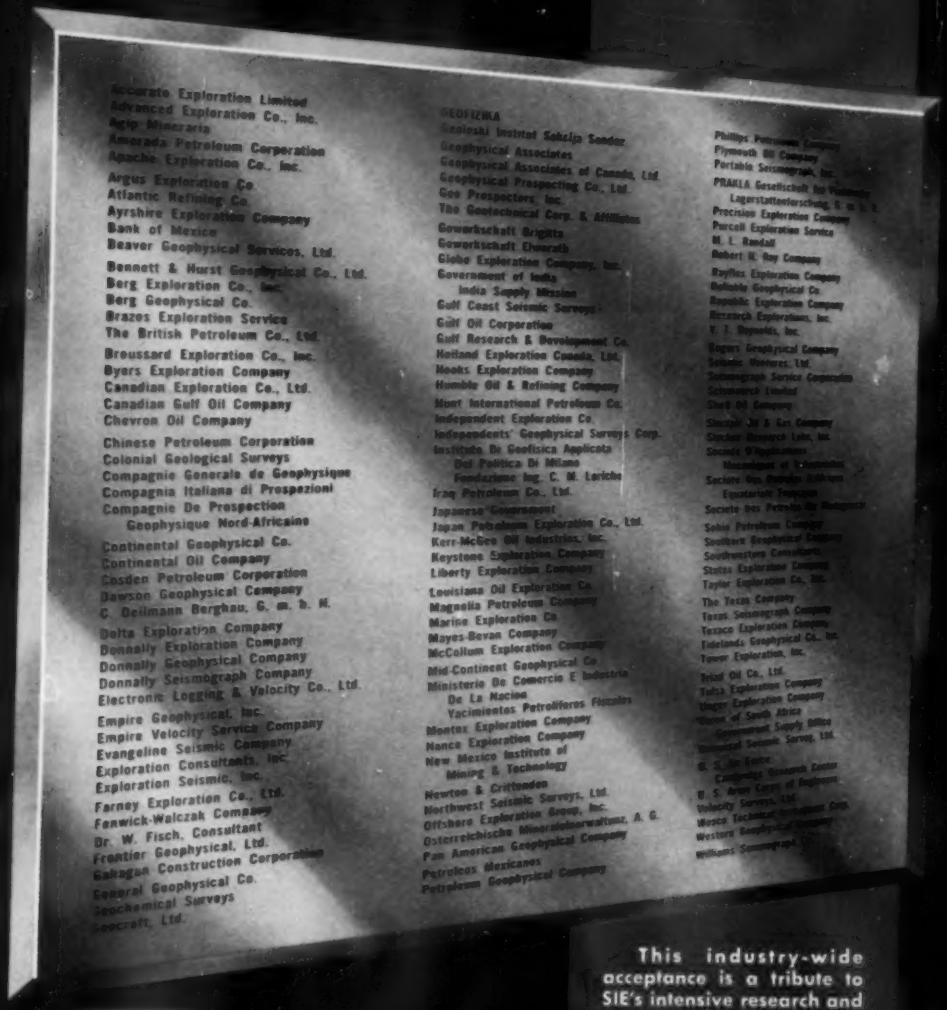


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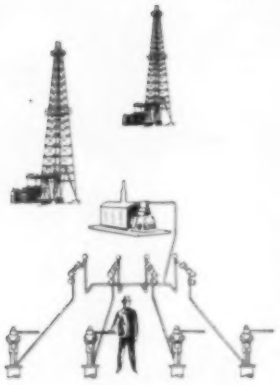

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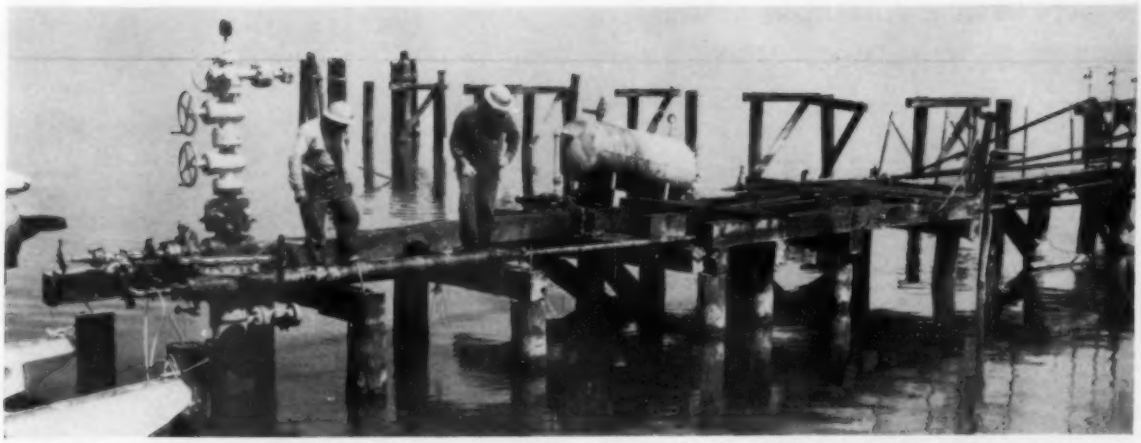


**FLOW of petroleum products to shore is of extreme importance. Here the wellhead is piped to shore above the surface of the water.**

anchor. In many cases two stern anchors are provided. In the foregoing case it was known by the owners that the stern anchor was too small and that the 1¼-in. anchor chain was old and undersized. It was for this reason that they attempted to tow the barge to protected waters. A more substantial anchor and new and heavier anchor chain have now been provided.

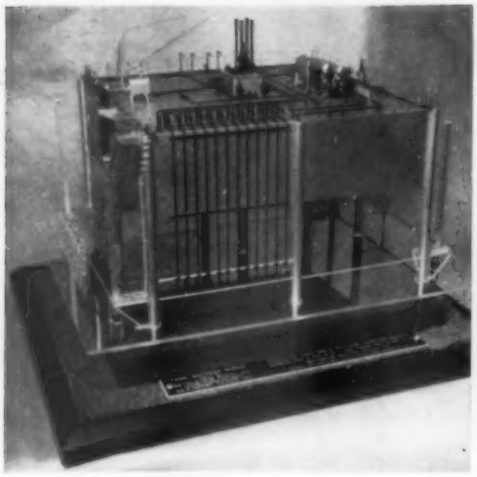
Another cause of this casualty was poor radio communication between the home office, the drilling tender, and the tug boats. The point of radio communication is of the greatest importance in offshore operations, and even the finest of radio equipment is sometimes not enough. Radio communication is necessary for immediate and positive contact between home office, shore base, drilling tender, tug boats, and crew boats. Even the automobiles of responsible supervisors should be tied into the communication system by radio. No equipment should be used which is not so equipped. For example, in plotting the path of the hurricane, Phillips' home office was aware that the original decision to head for Terrebonne Bay should be changed and that the tender should be towed west instead of north. This would have kept her in deep water and out of the eye of the hurricane. They were unable to contact either the drilling tender or the tug boats.

**Submersible barge . . .** The dry-dock-type submersible barge, Phillips' Rig No. 42, was located in the main pass area, west of the Mississippi Delta on Block 47. She had just been set on location and had not spudded in the well as the storm approached. The entire crew was removed and the barge left unmanned.

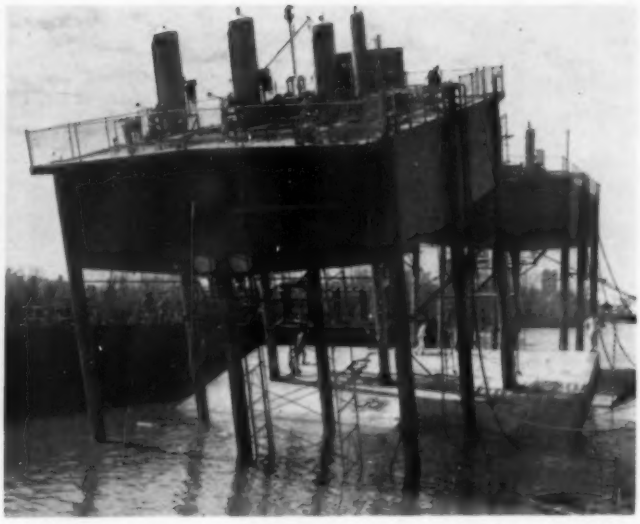
During a storm this particular type of submersible structure, with a large expanse of wing wall area, is particularly subject to wave action. As would be expected, the storm moved the barge considerably further than any other, to our knowledge. It was moved approximately 500 ft. and, as can be seen in the photo which appears on the first page of this article, the house structure was severely damaged. No apparent damage occurred to the steel structure of the dry dock. In normal and moderate weather conditions the owners are able to keep this barge on location by driving a heavy steel cylindrical caisson in the bottom. The caisson is 7 ft. 6 in. in diameter and made of ¾-in. plate. The caisson is directly below the derrick mast in the slot of the barge. By tying the barge to this caisson with heavy wire rope and turn buckles, the barge can move in heavy weather but rotates around the caisson, which causes no concern in the drilling of a well. The heavy damage to the house structure was obviously occasioned because this structure is too low and close to the water line. Normal practice is to put the drilling quarters about 50 ft. above the main water line. It is interesting to note here that the hurricane washed out approximately 6 ft. of the bottom in this area—the water depth was 22 ft. before the storm and 28 ft. after the storm passed. It is doubtful whether any caisson or spudding arrangement could possibly keep this particular barge from moving in a severe storm.

There are many problems in the offshore industry. Not only must wells be drilled, but the flow of petroleum products to shore is of extreme importance. This wellhead was piped to shore above the surface of the water. It is probable that the accepted means of such transportation will eventually be by subsurface piping. Certainly, transportation by barges is not economical or practical. In well production there are many types of processing units which are necessary; and often there must be, adjacent to producing wellheads, a variety of dehydrating equipment, separators, and in many cases, storage tanks and personnel quarters. There is, therefore, the problem not only of drilling a well, but of providing safe and practical producing stations. **End.**

**METHOD USED in getting well in Main Pass area back into production. Sheet-steel piping was driven and an 8-ft.-diameter caisson installed.**



MODEL of shallow-water mobile submersible tank-battery barge in "on-location" position. Fig. 1.



SHALLOW-WATER submersible tank-battery barges being tested for sinking and raising operation at shipyard. Fig. 2.

Needed: A new concept of offshore production facilities.
For an example of how designers are thinking, here's a . . .

# Mobile Submersible Tank-Battery Barge

## . . . which meets a twofold requirement:

1. Equipment to test well productivity and to provide storage for maximum allowable production during drilling required to define extent of field.
2. Equipment designed to last the life of the field, to handle immediate needs and accommodate growth.

By Ray Lacy

ECONOMICS and ease of operating determine the type of production facilities to use in offshore oil fields.

In the selection of a tank battery for a sheltered marine location—such as Breton Sound, West Delta, or Corpus Christi Bay—the economic consideration of the increasing spread between the cost of labor and material, the reduction in availability of second-hand barges, and the predominance of relatively remote drilling locations has made the need for a new concept and design of production facilities apparent.

Author is with Bethlehem Steel Co., Beaumont, Tex. Paper presented at A.P.I. Division of Production meeting, Southern District, Shreveport, under the original title, "Present and Future Offshore Tank-Battery Barges."

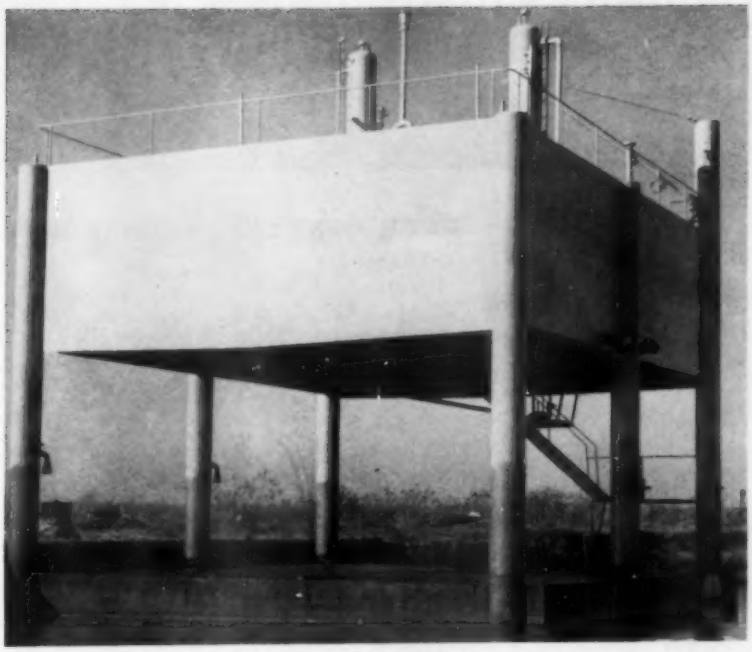
One design is the mobile submersible tank-battery barge. This unit takes advantage of fabrication and erection in a shipyard where shop fabrication, automatic welding equipment, heavy lifting facilities, and a lesser dependence on the vagaries of weather permit a greater productivity rate per man-hour than can usually be realized in field construction.

The mobile submersible tank-battery barge, Fig. 1, consists of a shallow barge or mat and a rectangular storage tank supported above the mat by columns.

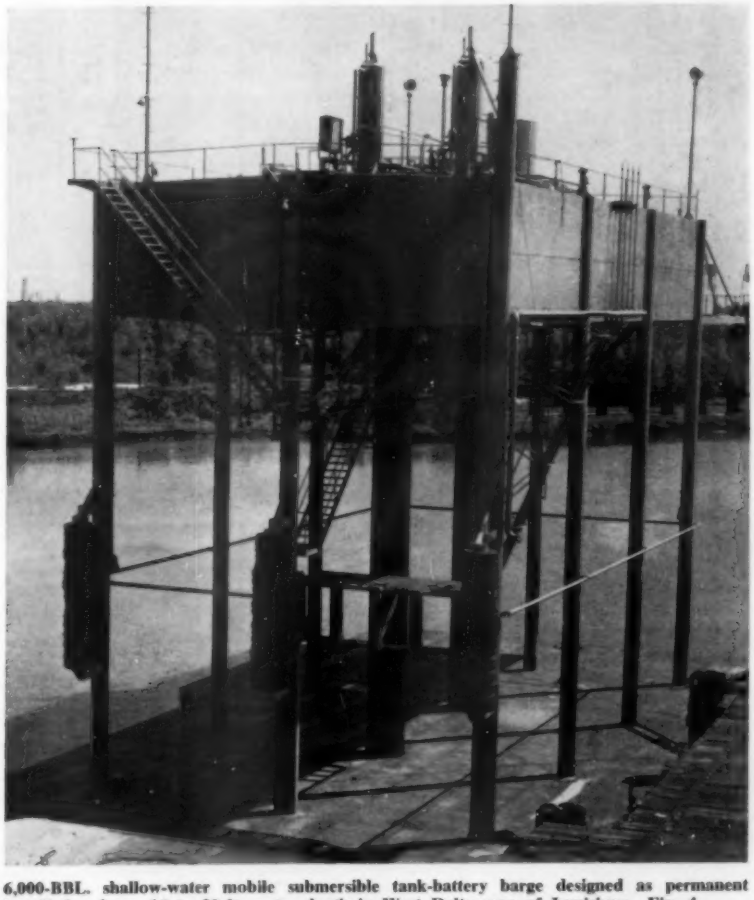
The mat provides mobility by acting as a barge for the transportation of the unit and provides the foundation on location by acting as a spread-footing base after submergence.

On location, the columns support the storage tank at an elevation above the water to permit storm-wave passage with minimum structural resistance. The tank provides storage for accumulating production. The tank top serves as the operating platform on which are installed the separators, metering devices, flow-line manifolds, and related equipment.

To place the mobile tank-battery barge on location requires a tug, a small work barge, portable water pumps, and preferably a portable air compressor. No special erecting equipment is required. The unit is towed to location in the same manner a conventional barge is handled. By selective flooding of the four internal compartments, one end of the barge is



2,000-BBL. shallow-water mobile submersible tank-battery barge designed as temporary installation unit. Fig. 3.



6,000-BBL. shallow-water mobile submersible tank-battery barge designed as permanent installation for a 16 to 20-ft. water depth in West Delta area of Louisiana. Fig. 4.

sunk until it is on the ocean floor, Fig. 2. Positive lateral stability is then assured by the ground contact, and flooding of all compartments is completed. At no time during the sinking operation is the barge without a reasonable margin of stability. The air compressor is an emergency measure to allow for raising of the barge should it become desirable.

The raising operation is the reverse procedure of sinking. One end is deballasted completely. After the compartments in the raised end are completely empty, the other end is then deballasted. The deballasting is accomplished by forcing the water out with very low-pressure air provided by a portable air compressor. This system of sinking and raising requires the minimum built-in equipment, thus a lower capital investment. The pumps and air compressor may be rental or field equipment and could be considered as temporary operational expense.

To prevent corrosion within the mat, the operators have been using chromate inhibitor. Exterior underwater corrosion is controlled by cathodic protection. The columns in the way of the spray zone are sheathed with 18-gage monel to prevent corrosion, and conventional methods of painting are used on the tank and process equipment.

At the present time there are 12 mobile submersible tank-battery barges in service. They range from 2,000 to 10,000 bbl. in capacity. The sinking depth varies from 8 ft. to 20 ft. of water, and soil-bearing loads are from 300 to 800 lb. per sq. ft.

In the development of a marine oil field, the requirements for production facilities usually pass through two phases. The first is the need for equipment to test well productivity and to provide storage for maximum allowable production during the drilling required to define the extent of the field before installation of permanent production facilities. In this phase it is desirable to have a unit that can be temporarily installed without too much consideration required concerning the ultimate location of the permanent tank battery. It should be completely salvable at minimum expense.

The second phase of development occurs when the characteristics of the field are established well enough to permit planning and installation of the long-term production facilities.

A unit, to fulfill the requirements of this phase, should be designed for the life of the field. It should have adequate storage capacity and space for installation of production equipment to handle the immediate needs

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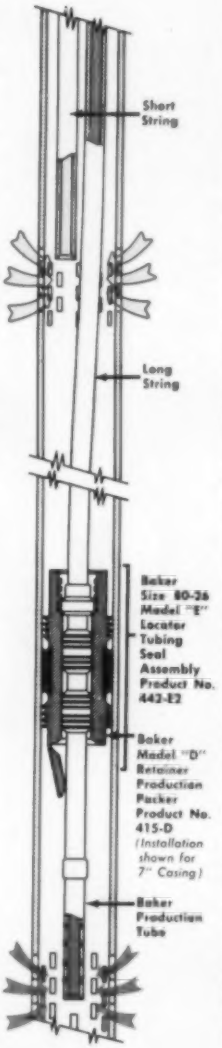
Short String
Long String
Baker Size 80-26 Model "E" Locator Tubing Seal Assembly Product No. 442-E2
Baker Model "D" Retainer Production Packer Product No. 415-D (Installation shown for 7" Casing)
Baker Production Tube

Permits removal of either string independently of the other regardless of sequence. Full-Opening (Tubing I.D.) Long String to lower zone.

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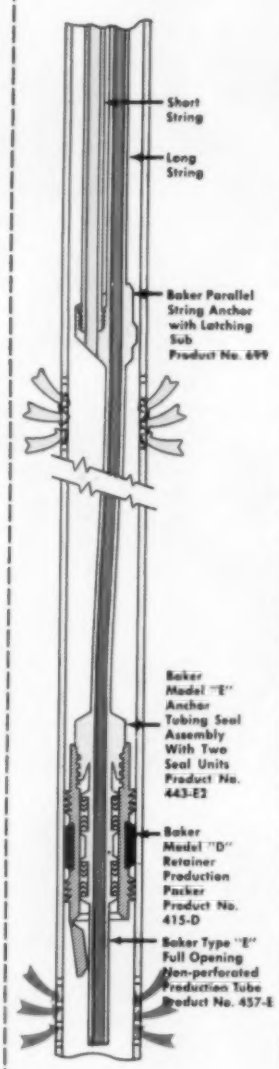
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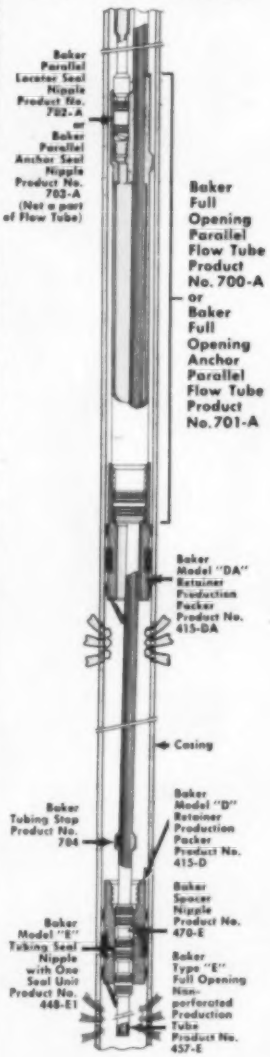
Baker Parallel Locator Seal Nipple Product No. 782-A or Baker Parallel Anchor Seal Nipple Product No. 702-A (Not a part of Flow Tube)
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Casing
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Illustrates Two-Packer parallel string installation with each zone confined to its individual tubing string with full-opening to lower zone for use of all permanent-type completion tools.

**LAYOUT of tank-top operating platform on 6,000-bbl. unit showing 100-bbl. test tank, expansion trunk with vent and gaging hatches, well-line manifold, and two separators and foundation for a third. Fig. 5.**

of the field and to accommodate growth as it occurs.

The mobile tank-battery concept can with appreciable flexibility fit into either or both phases.

The 2,000-bbl. unit, Fig. 3, exemplifies the temporary-installation concept. It has adequate storage capacity for the early phase of field development, testing and producing separators, gas-metering equipment, and flow-line manifolding for four wells. The unit has been designed to operate generally under similar conditions to those experienced by inland drilling barges. The maximum sinking depth is 8 ft. and the soil bearing under full load conditions is 700 lb. per sq. ft. These conditions were imposed as economic limitations. The operator believed that the conditions could be expected in the majority of his leases. Where greater water depths or lower soil bearings might be experienced, these conditions could be overcome by the use of sand or shell fill. This reduced the capital investment appreciably, and the cost to meet special conditions can be treated as operating expense after production has been discovered.

In the second phase of field development—when permanent installations are required, the 6,000-bbl. unit (Fig. 4) typifies the mobile tank-battery-barge solution.

This unit, designed for a specific area and field conditions, is considered by the operator as a permanent installation. The location has been dredged to 4 ft. below the surrounding ocean floor, thus permitting the deck of the 4-ft.-deep barge or mat to be flush. This reduces the possible scour action to a minimum and leaves only the columns to offer wave resistance. The column design is based on maximum known storm-tide and wave conditions and 125-m.p.h. wind loading.

The storage-tank capacity has been sized to accommodate 50 per cent above average production requirements to permit continued production when weather conditions interfere with normal barging operations.

The initial process-piping and equipment installation, Fig. 5, was planned for production for the existing wells and those anticipated within the immediate future, but foundations for future separators were installed during construction. The piping installation was also arranged so that future wells and increased production can be accommodated with the minimum on-location work to expand the installation.

Another concept of the mobile tank battery is to build a unit that can be used under a very wide rangement of conditions as an exploration tool and yet be of sufficient size and with enough process equipment so that the unit may be left as a permanent installation.

It is interesting to note that one operator, having built two units for permanent installation in a specific field in Texas, found that the second unit was not required as a result of production problems. This unit has since been used by the operator on several temporary locations and is now being leased to another operator for use in southern Louisiana.

The future of the shallow-water mobile submersible tank-battery barge appears to be attractive in view of the experience at hand. The initial capital-investment requirements compare favorably with wooden structures and generally represent less investment than other types of field-erected structures.

**Operating problems . . .** The weather experience which covers a period of 7 years in the Mississippi Delta area has been extremely satisfactory. The path of the hurricane Flossie passed directly through the west delta area. Three units, although apparently having been in the eye of the hurricane, withstood its ravages without casualty. Two other units, one in Lake Pelto and one on the east side of the Mississippi in the Black Bay area, experienced appreciable wind and wave action from hurricane Flossie without distress.

The next step in the development of this type of equipment is in the open waters of the gulf and in water depths of as much as 100 to 150 ft.

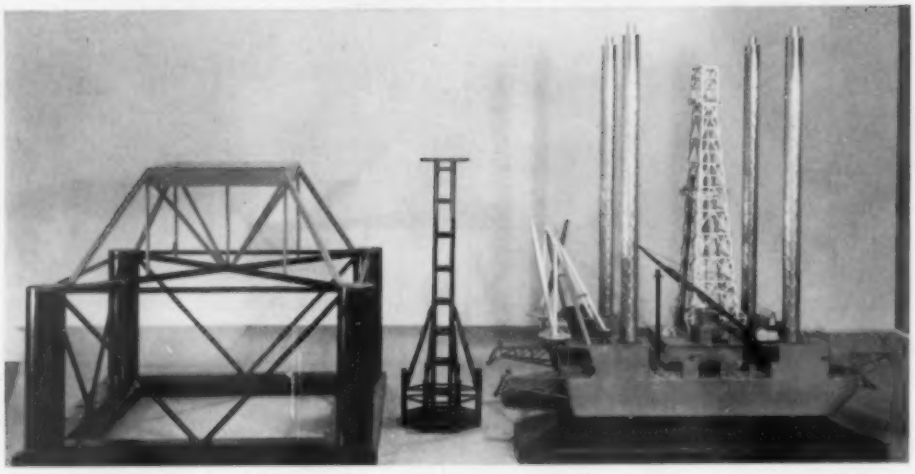
Structural size increases rapidly as operating depth becomes greater. The interplay between structure, depth, and stability rules out of the use of the same "end-sinking and raising system" that was used on the shallow-water unit for depths greater than 30 ft. of water. To provide stability afloat while sinking, to resist overturn when on bottom, and for maximum simplicity of the sinking and raising operation, several changes become necessary.

The deep-water unit, Fig. 6, would have the three component parts as has the shallow-water tank-battery barge. However, the functions and size would be varied appreciably. The upper tank would continue to act as a storage unit but would probably be subdivided into more compartments. The tank top would continue to act as the operating platform; but, in addition, the tank would be used to counteract the buoyance of the oil stored in the underwater body. The four corner columns would be increased in size to provide stability in sinking and raising.

The mat, to provide stability afloat and to resist overturn as a foundation, would be square or approximately so.

The sinking or raising of the deep-water submersible tank-battery barge would be a relatively simple operation.

To place the unit on a temporary location, the equipment needed would be tugs for towing and positioning and portable air compressors for possible raising, should it become necessary. Upon arrival at location the sea valves in the mat would be opened, flooding first the mat and then the large-diameter columns, to permit sinking in a manner similar to that of sinking an inland drilling barge.



**MODEL of deep-water mobile submersible tank-battery barge, individual well-protection structure, and deep-water mobile drilling platform. Fig. 6.**

During the sinking operation, after the mat has been submerged, the large-diameter columns provide water plane and stability to assure a controlled sinking operation. The movement would be vertical rather than first one end down and then the other. To raise the unit, the air compressors would displace the water with low-pressure air and the unit would rise in a vertical manner.

Should the unit be a permanent installation, it becomes necessary to pin the unit to the ocean floor. This can be done by utilizing a newly developed pipe clamp that permits underwater attachment of the pipe to the lower mat only.

To move the unit would require a diver to cut these clamps loose from the piling. The expense of this infrequent operation is more than offset by the reduction in capital expenditure which would be needed to pin the unit down with other methods presently available.

**Deep-water installations . . .** The sizes increase as the operating depth becomes greater. A unit for 90 to 100 ft. of water would have four corner columns of approximately 20-ft. diameter, and the mat would be approximately 190 ft. square.

To remain in the same per barrel cost range as the shallow-water units, it becomes necessary to use the large volumes in the columns and mat for oil storage. The capacity of a small unit for 60-ft. water depth would be about 30,000 bbl., and in 90 to 100-ft. water depth, about 40,000 to 50,000 bbl. One hundred thousand barrels, or greater, capacity would reduce the per barrel cost and would present no real problems to build. This increase in storage capacity would, from the operator's viewpoint, reduce the frequency of the discharge operation. It also will allow for the greater weather contingencies that affect delivery and sale of oil from the tank battery.

The use of the upper tank as counterweight or ballast to offset the buoyancy of the oil stored under water and the salt-water venting system of the lower sections is essential to this operation.

In this usage the oil is first produced into the upper tank, treated to knock out water, if necessary, and accumulated. As the upper tank fills up, the accumulated oil is allowed to flow into the columns and mat. The water displaced in this operation is vented from the mat.

This introduces an oil-water interface. However, because of the large volumes and areas involved, turbulence will be negligible. The discharge of oil for sale delivery is made from some of the compartments in the upper tank, while the oil in the underwater storage is pumped to the upper tank and gaged. At the same time, salt water replaces the oil in the lower section. This method of operation makes the upper tank the first to fill and the last to empty, thereby keeping maximum topside weight to offset the buoyant effect of the submerged oil.

The problem of preventing overfilling and introducing oil into the ocean through the salt-water vents can be solved in several days. One system that has been tested is the use of an electric circuit that depends upon the difference of conductivity between salt water and oil to control the flow of oil into the underwater section.

For cargo discharge, there is the possibility of tanker movement in addition to the existing methods and equipment. Most deep-water locations will be a considerable distance from shore because the average water depth increases on the order of less than 2 ft. per mile on the upper Gulf Coast. With storage of 50,000 to 100,000 bbl. per battery available at sea and with liquid-cargo transfer systems that have been developed and are operating at sea in many places, the tanker operation could be more than competitive.

The mobile submersible tank-battery barge may have far-reaching effects on the deep-water offshore operation. It is possible that with a storage and production unit of reasonably low unit cost, the mobile drilling platform can be considered an economical development tool instead of an exploratory tool only. The present self-contained platforms for deep water are usually designed for little more than maximum loads encountered during the drilling operation. These loads are the equivalent of approximately 10,000 to 15,000 bbl. total oil storage.

This capacity is generally considered inadequate for a 9 to 10-well location any distance from shore. To provide sufficient storage requires supplemental facilities. To recover maximum allowable production from the completed wells prior to completion of the drilling program on a self-contained platform also presents a problem that to date has not been resolved to the complete satisfaction of all concerned. The submersible tank-battery barge may justify consideration in both problems. When the mobile drilling unit, the mobile submersible tank battery, and the elimination of the need for directional drilling are combined (Fig. 6), it appears that they justify very serious consideration.

The entire drilling load of a self-contained platform is nominal when compared with the weight of 10,000 to 15,000 bbl. of oil. Study is being devoted to a mobile submersible tank battery that can also be used as a self-contained platform for drilling. This unit would have the same general shape as the previously described tank battery. However, the upper tank would be modified to accommodate a drilling rig.

This would permit oil storage in a portion of the upper tanks and all of the underwater body. **End.**

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## *For that needed "new approach" in oil hunting, why not begin to think in terms of*

# FROM THE BOTTOM UP?

**By R. F. Bennett**

TO OIL FINDERS everywhere, the rising exploration costs are a perpetual challenge to discover a way to reduce the accelerating trend which set in about 1943.

Due to the continued demand, U.S. domestic production of crude oil increased from 3.5 million barrels per day in 1937 to nearly 7 million barrels per day in 1955. (Fig. 1). It continues to increase at a rate of more than 5 per cent per year. The curves showing world production and U. S. production of crude oil, together with a U. S. demand curve, have been extrapolated to 1975 on the basis of the average of estimates made by leading petroleum economists, and these curves show an increasing divergence between demand and producing capacity. World production continues at a rapid rate of increase, but the demand for oil abroad is increasing more rapidly than our own.

In Fig. 2 the rapidly rising costs of oil finding are illustrated from statistics derived by H. J. Struth. They include exploration overhead, geology, geophysics, leasing, and exploratory drilling, and contrast sharply with the dwindling reserves found per dollar.

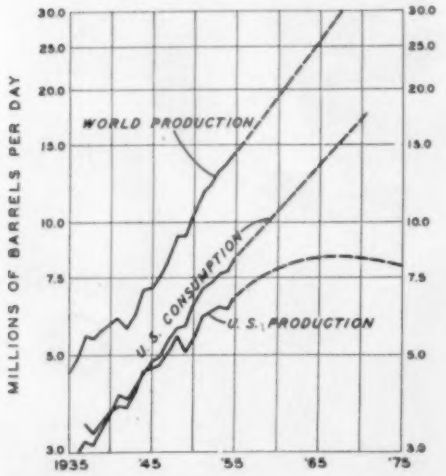
The statistics in Fig. 3 show that wildcat drilling has increased nearly threefold in the last 10 years in our constant effort to maintain reserves and increase them modestly beyond the current production rate. Drilling in 1956 resulted in 13,048 wildcat wells—a new record. The number of domestic oil and gas fields discovered between 1948 and 1956, as a result of the increased tempo of drilling, is displayed by years in Fig. 4. An annual increase in new-field discoveries was maintained until 1953, however, at that time the discovery rate leveled off at about 1,400 new fields per year during the last 4 years.

Up to 1952 we were doing fine—drilling more wildcats and finding more fields, but from 1953 to 1956 the drilling of new wildcats did not result in a continued increase in the discovery of new production. Statistics indicate another factor; namely, that the increase in new fields has been offset by less recoverable oil per well drilled (Fig. 5). These data show a decrease of 45 per cent in recoverable barrels per well drilled. Thus, we are forced to run just to stand still.

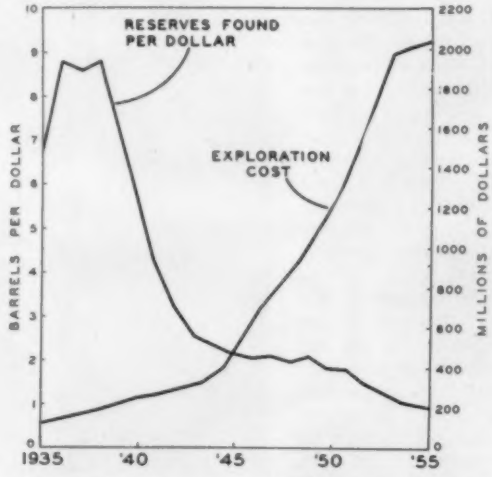
These statistics make our present oil production problem clear; we must meet by every means in our power the ever-increasing demand brought about by the upsurge in industrialization; we must explore, exploit, and market oil and its derivatives much more efficiently, particularly, by more efficient use of our exploration tools. If we do not, the petroleum demand will be met by increasing importation of foreign oil.

**New approach needed . . .** The exploration tools that have served us so well in the past have been tremendously improved in recent years, but I firmly believe that their present use does not exploit their full potential. There is a saying that poor workmen blame their tools. But if the tools are good, perhaps something is wrong with the workmen, or in our case with

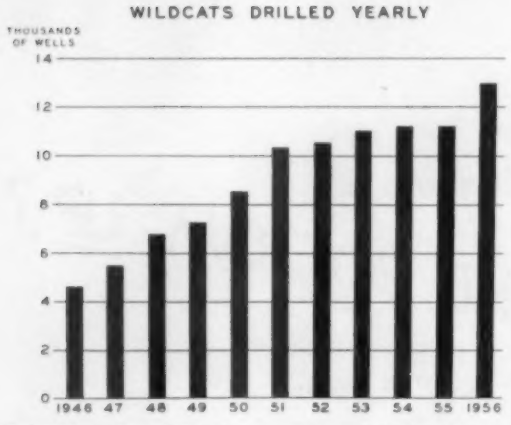
The author is president, Society of Exploration Geophysicists. This is an abridged version of a paper presented before the national meeting of the American Association of Petroleum Geologists in St. Louis, in April 1957. The entire text will appear in the July 1957 A.A.P.G. Bulletin.



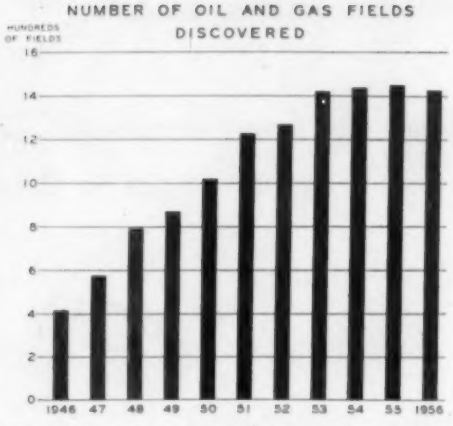

**WORLD PRODUCTION and U. S. demand will continue to soar, but forecasts indicate the U. S. production will begin to decline by 1965. Fig. 1.**



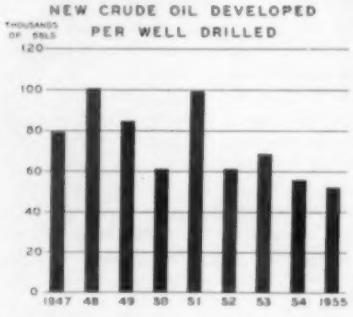

**EXPLORATION costs in the United States are rising at an alarming rate, while new reserves found each year are declining. (Statistics courtesy of J. H. Struth.) Fig. 2.**




**WILDCAT DRILLING has increased nearly threefold in the past 10 years as the U. S. tries to maintain its position as leader in the world petroleum picture. Fig. 3.**




**THE NUMBER of new fields discovered each year has leveled off since 1953 in spite of an increasing number of wildcats each year. Fig. 4.**

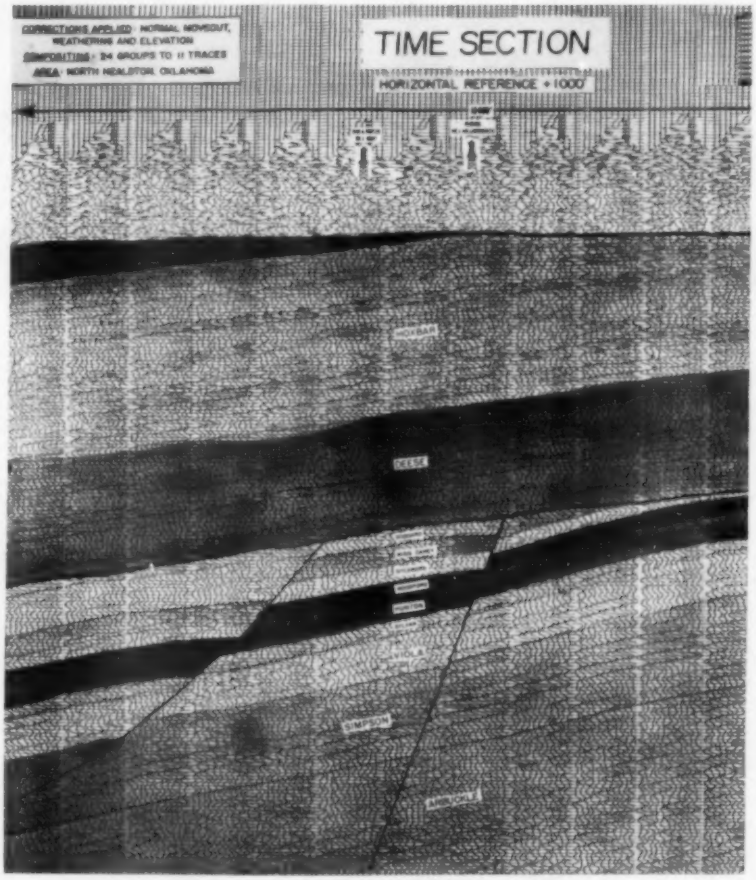



**EACH NEW WELL finds less oil as the years pass. Today each new well proves up only 50,000 bbl. of oil compared with 100,000 in 1948. Fig. 5.**

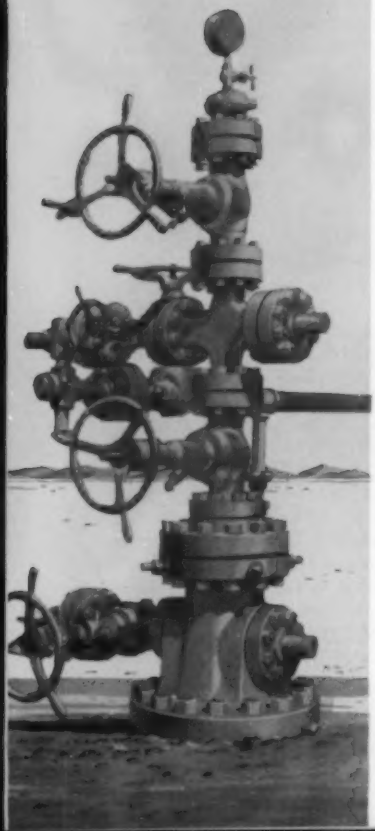
the approach to the exploration problem.

Historically, we have explored for oil from the surface downward. We used oil seeps as our first clue, and drilled shallow wells. Then with the aid of surface geology, exploration was extended to deeper and deeper horizons. As each layer of rock was probed, we encountered all the geological complexities—unconformities, evidence of faulting, buried topography, reefs, and sometimes entirely new oil-bearing stratigraphic sequences. Geological and geophysical exploration anticipated some of these complexities. However, our approach to the problem was from the top down, and it did not provide the whole answer.

Nature deposited the sedimentary section from the bottom up in an orderly manner, so why not use our best geological information and concepts, together with our geophysical tools and techniques, to change our thinking pattern from the bottom up also. Billions of barrels of oil have been found on the premise that there is a direct correlation between velocity discontinuities and geological strata. However, there are fewer of these more easily mappable structural features to be found. In recent years we have become aware that structure and sedimentation are not independent, but are so closely entwined so as to be inseparable. Structure from the broad architecture of a basin to local movements during deposition indelibly leaves its imprint on later sedimentation. This geological concept has not been fully exploited, and it is through this connection between structure and deposition that geologists and geophysicists can make their greatest contribution to the finding of




**RECORD SECTIONS are a decided asset in working "from the bottom up." They force an integrated interpretation of the entire sedimentary section. (Courtesy Geophysical Service, Inc., Dallas.) Fig. 6.**



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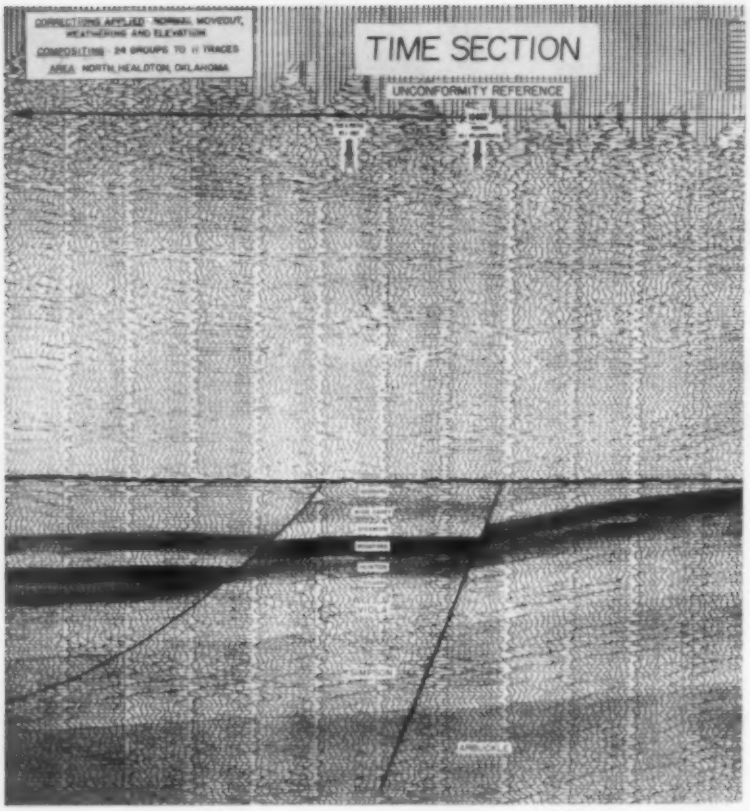


**HERE is a time section using the same data as Fig. 6. Datum is the major unconformity at the top of the Goddard shale and shows the structural geology prior to deposition of the Deese and Hoxbar sediments. (Courtesy of Geophysical Service, Inc., Dallas.) Fig. 7.**

the more obscure and subtle kinds of oil accumulation.

A study of rocks from the bottom up implies chronological examination of the structural and sedimentary history of a basin, and a close examination of the basement architecture and deep-seated structural features will frequently provide clues to the locations of shallower structural and stratigraphic traps. Speaking of stratigraphic traps reminds me that some companies have now added a new job title to their exploration staffs; namely, the geophysical stratigrapher.

These men, with the aid of electrologs, density logs, continuous velocity logs, and seismic record sections, can, I feel sure, make a much fuller evaluation of the sedimentary conditions necessary for the recording of seismic reflections.

**Geophysical techniques . . .** The magnetometer, now airborne, has been used with great success in many areas to outline the basement architecture of oil-producing basins. The interpretation difficulties associated with total field measurements have now been largely overcome. The gravity meter is also a proven tool to provide information on a regional sedimentary relationship, as well as to delineate major structural features. However, the use of residual methods in an attempt to emphasize shallow anomalies has many times destroyed the evidence to interpret deep-seated anomalies which affected subsequent deposition. The use of high-speed digital computers now makes possible the removal of different degrees of the regional gravity fields so that the significance of the deep-seated anomalies can be preserved. The development of the gravity simulator, which is really an analog computer, enables gravity profiles to be constructed over hypothetical features for comparison with observed profiles.

**Seismic record sections . . .** Perhaps the most important advance toward integrated studies of the whole sedimentary section is the use of corrected seismic record sections. Mechanical or optical scanning and plotting equipment provide us with seismogram sections consisting of all the individual traces corrected for elevation, weathering, and normal moveout time; and the use of all these traces of a seismogram increases the information available to the interpreter many times.

The corrected record sections make possible, and may even force, an integrated interpretation of the entire sedimentary section producing reflected events. At the same time, it is a valuable means of displaying the data to the exploration team, as well as to management, for proper evaluation annd better understanding of the risks involved when the interpretation is neither black nor white.

Fig. 6 is an excellent example of a record section of this type taken from an area in southern Oklahoma. It is a full envelope seismic section with all traces corrected and plotted with reference to a sea-level datum. Fig. 7 is similar to the section of Fig. 6.

The intelligent use of the magnetic, gravimetric, and seismic methods of subsurface exploration, combined with all the instrument improvements and interpretation techniques developed in recent years, integrated with sound geological thinking, the results of drilling, formation testing, and the interpretation of the many types of bore hole surveys, must inevitably result in a better and closer understanding of the structural framework of the subsurface. If, in addition, we change our emphasis in viewing the problem of oil exploration from the top down, to a study of the section from the bottom up, and at the same time, if we are aware of the possible influence of structure on subsequent deposition, only then can the petroleum industry continue to meet the demand for a continual supply of petroleum products. Perhaps we should also do well to remember Wallace Pratt's warning that we have looked so hard for anticlines that we have forgotten to look for oil. If we stand back and look for the conditions which might give rise to structural traps—reefs—concentration of oil pools, instead of always looking for the trap, we might find more understanding, and we might find more oil.

Successful oil exploration today and in the future is extremely important to us as individuals living in a country whose standard of living is based upon the almost unlimited use of high-energy fuels. Inevitably our exploration success will diminish in time much in the manner predicted on the extrapolated portion of the curve for U. S. production shown in Fig. 1. After all, we are dealing with a finite and essentially unrenewable source. But that the time has now come, I am not ready to admit. I am optimistic that this year—next year—and for many years to come, we will combine our geology and geophysics in the proper manner to learn the earth's sedimentary secrets from the bottom up.

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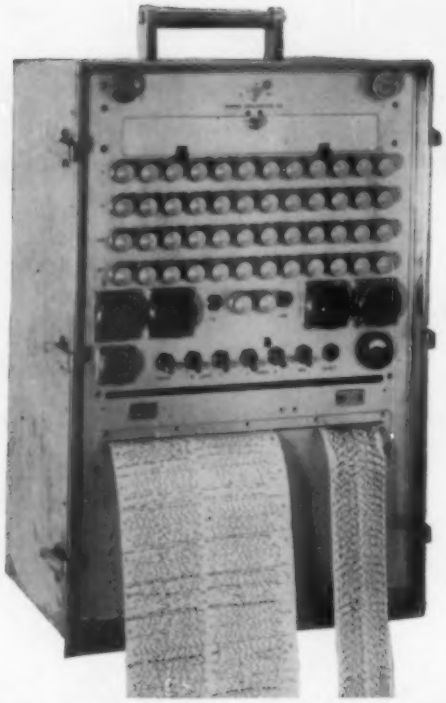
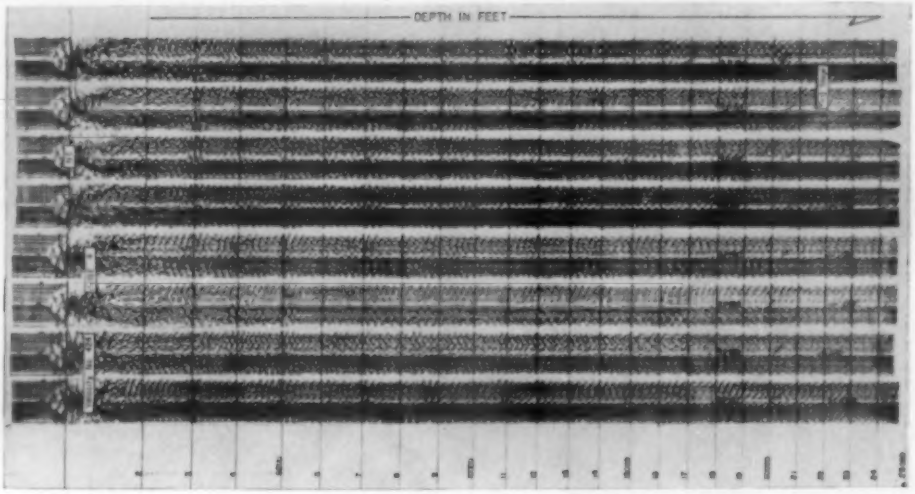


# The Seismogram Section

. . . new oil-finding tool promises to be the means of better seismic interpretation . . . and a step toward the integration of geological and geophysical thinking.

**By Sam M. Pena**

**DUAL CAMERA simultaneously produces a conventional record and a small-scale duplicate seismogram. The latter is used to build the record section. Fig. 1.**

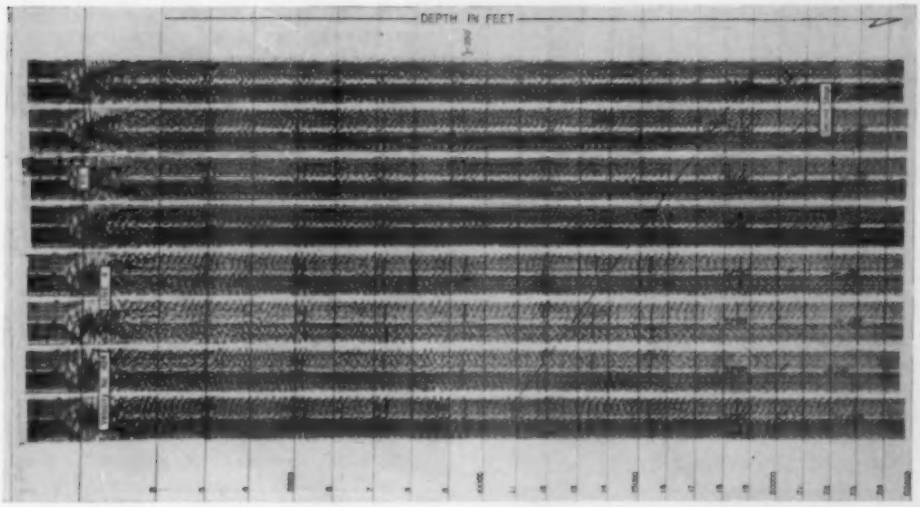



**AS SOON as the day's records are brought in, they are force dried, quickly corrected, mounted, and printed for appraisal early next morning. Copies are also mailed to the supervisor and client. Fig. 2.**

THE SEISMOGRAM section is a recent development that will lead to better seismic interpretation. It is a positive step toward ultimate integration of geophysical and geological thinking. Seismic interpretations can be quickly checked for geologic compatability. At the same time, the seismic picture is substantially strengthened by removing much of the human-element factor from the final analysis.

The weakest link in the chain of seismic computations is the common practice of transferring the seismic time events from the seismogram on to a cross-section. This section provides the interpreter with a true-scale, two-dimensional composite and uncluttered picture of the geologic section underlying a line of shot points. But humans select those data which are believed to be pertinent to the problem at hand; and the same humans omit anything believed to be too shallow, too deep, or questionable. The too shallow and too deep can be given clear-cut limits. However, the questionable has no assignable bounds. And it is precisely this wide latitude that permits the human-element factor to enter the picture. Unfortunately, experience has shown that segmentary and seemingly questionable irregularities can be, and sometimes are, subtle indications of undrilled oil fields. The human element factor, therefore, is a direct function of the magnitude of omissions, and is physically impossible to evaluate.

The construction of this uncluttered cross-section is a present-day basic computation step which the seismogram section will ultimately supplant. However, the inevitable transitional period will be with us for some time, and so will the conventional plotted section. Therefore, if the human element has deprived the cross-section of the full seismic spectrum, then it should be treated as an inconclusive equation. And the final interpretation should be withheld until the seismogram section has reinserted the events




**SAME seismic section as Fig. 2 except that the party chief has made a fast graphic interpretation. Notice the tentative fault location and the southwest dip of 250 ft. of the reflecting horizon at 9,300 ft. Fig. 3.**

**COMPLETE section shows the vertical velocity distribution, the gravity lead, the subsurface data (dotted lines), the seismic dip, and the interpretation. In practice, the section is colored. Note: The line of shot points is not normal to the fault. Fig. 4.**

inadvertently omitted by the human-element factor of selection.

The seismogram section is composed of small-scale seismograms fully corrected and properly tied into a subsurface profile. This section can be used for superimposing the tentatively resolved seismic horizon attitudes to check for conformance against the seismic events upon which they were based. And most important, the section returns to the equation the full seismic spectrum for complete appraisal by the interpreter.

**Applicable to field work . . .** The simplest, most effective, and most economical seismogram section can be compiled in the field. A dual recording camera simultaneously produces the regular and a duplicate small size record for the seismogram section. (See Fig. 1.) It is simple because it requires a minimum amount of effort to compile for use; it is very effective because it can be put to use immediately; and it is economical because the only real cost is the small cost difference between a single and a dual camera.

Fig. 2 shows the seismic section of a day's shooting. It is reproduced the same day the records are shot and affords the party chief an early idea of the quality of the seismograms and the penetration of energy to yield usable data. A similar copy is mailed to the supervisor and client's representative. After a brief preliminary appraisal, the section graphically shows direction and magnitude of dips, fault possibilities, and the depth of correlative reliability. The end result inevitably makes for an effectively directed crew and closely advised supervisors and clients.

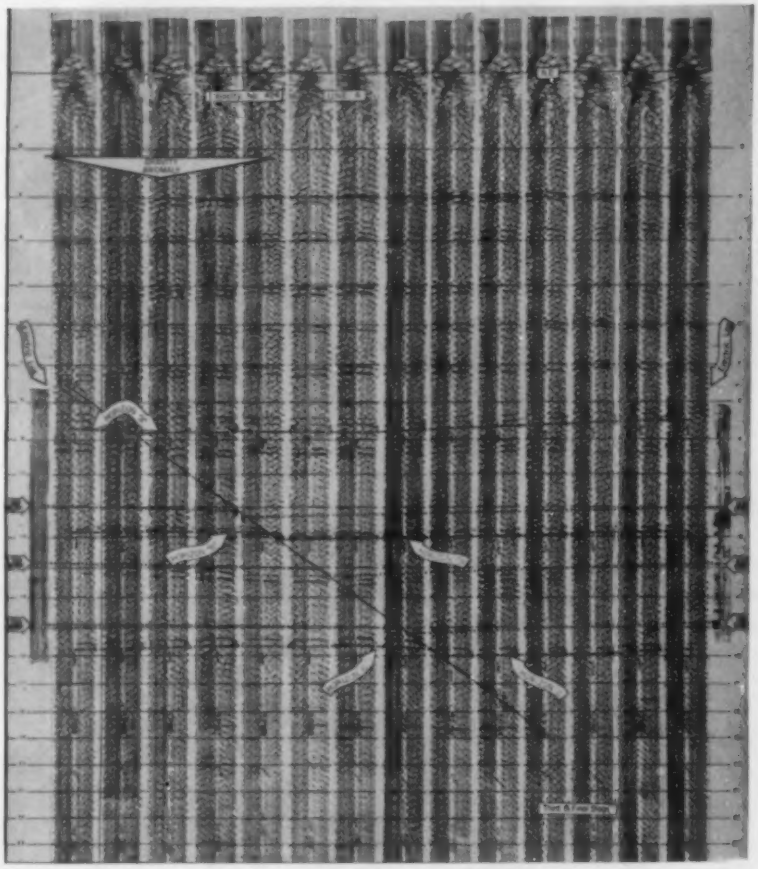
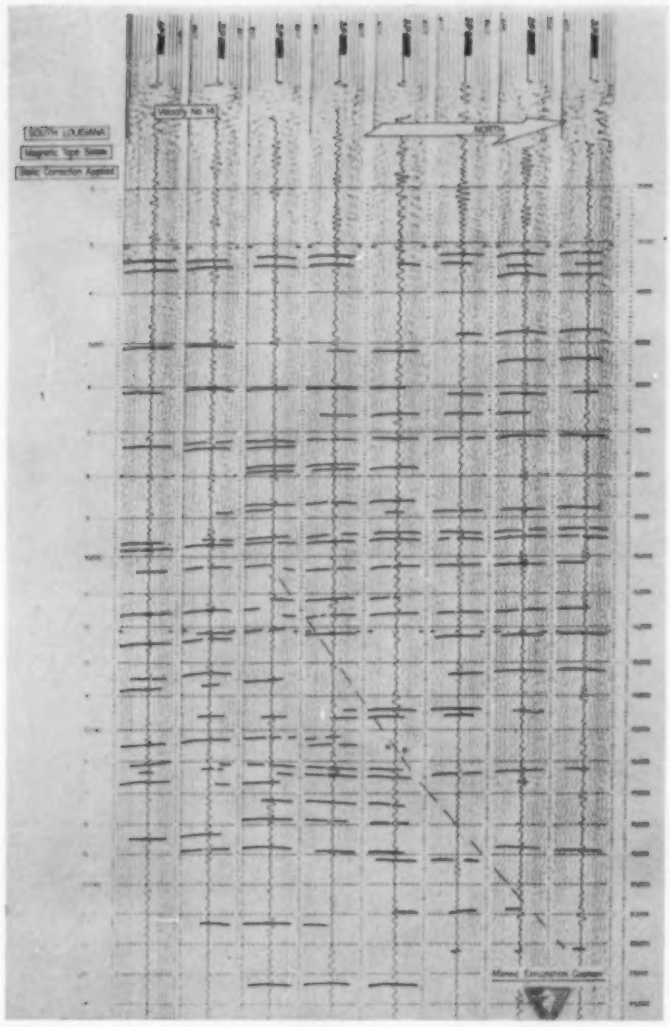


Fig. 4 is the final interpretation of the work seismogram section that accompanies the written report for instant review or future consultation. The daily segments have been spliced into the full line. Superimposed (usually in color) are the gravity-anomaly surface projection, the subsurface attitudes with electric logs, the seismic dip vectors, and the seismic horizons A, B, and C; the latter have been resolved by conventional computations of the large records. The seismic dips across the records impart to the trained

**THE AUTHOR**

**Sam M. Pena is chief geophysicist and vice president of Marine Exploration Co., Houston. He is a graduate of University of Houston and has worked in a geophysical office since 1936.**

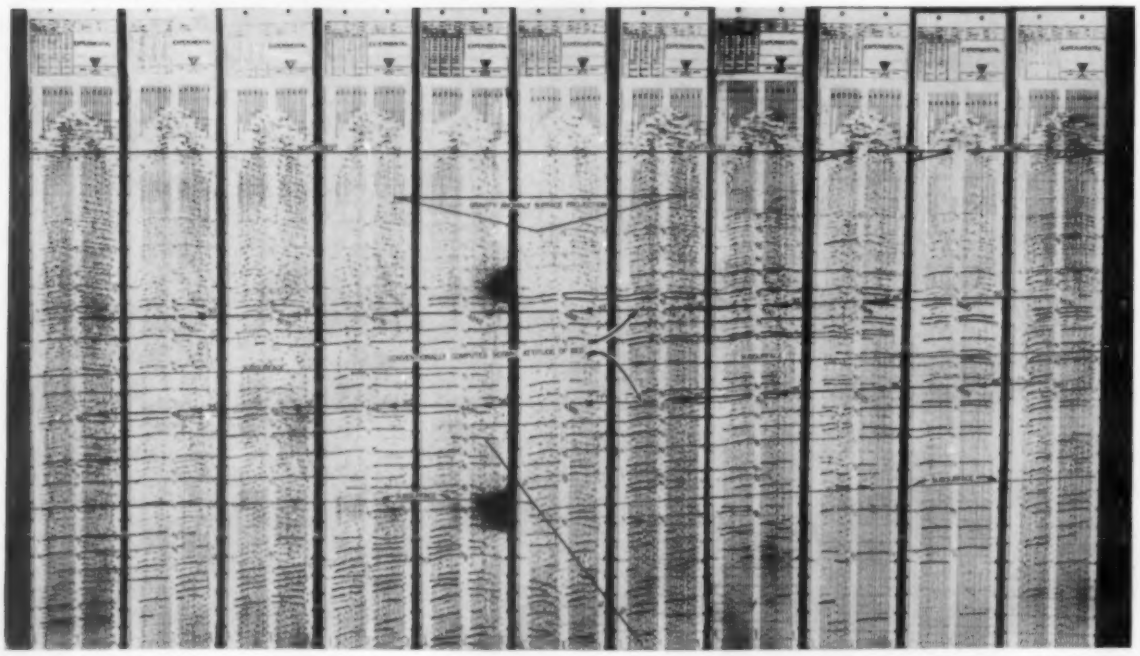


mind an instant awareness of the direction and magnitude of dip. The section gives a direct visual comparison between the resolved seismic horizons and the subsurface geology, based, of course, on an electric-log solution of the same geologic problem.

At this stage the interpreter has all data on one medium, to scale: the corrected seismic events readable in feet; the subsurface attitude from electric logs; the seismically resolved geologic horizons; the surface location of the gravity anomaly; the direction and magnitude of seismic dip vectors; the fault; and a graphic illustration of vertical velocity distribution. Any disagreement between geology and geophysics is readily apparent and the geologist and the geophysicist can work together to arrive at a mutually agreeable solution.

One very important function of the seismic section is the time it saves the geophysical supervisor, the geologic coordinator, or the consultant; it provides a single compact medium with 90 per cent of the record matching "leg work" taken out. The normal, or negative 70 or 80 per cent of an area becomes obvious. This portion is quickly eliminated by the experience-

**MAGNETIC TAPE played back through the dual camera and made into a seismic section. All traces have been corrected for elevation and weathering. Bed at 9,500 ft. dips 375 ft. to the south. Fig. 5.**



**NOTICE how the composite picture brings to focus the deep discontinuous data. Turnover into the fault is evident that is absent in the shallower beds. Fig. 6.**

trained mind, and supervisors or coordinators can spend 100 per cent of their efforts on the "meat" of the prospect. The reduced scale of the seismic section permits the analyst to see the "forest," so to speak, and quickly grasp the over-all picture. Such complete graphic representations of geologic problems are much more informative to, and acceptable by, management. These time-saving features, not to mention the satisfaction and economic merits of correct interpretation, also contribute realistically to alleviate the current nationwide shortage of highly trained professional geophysicists.

For those companies that do not employ a full-time geophysicist, the seismic section, properly corrected and worked, offers an easily understandable graphic picture of the seismic results for a comprehensive visual inspection. And if the subsurface, the seismic resolution, and the seismic dip vectors do not conform in general, then the solution cannot be considered conclusive. Further study is demanded of the contractor or consulting geophysicist and the geologist.

It may be well to state here that seismic events that dictate involvement by the geophysicist in problems relating to weathering, migration, multiples, velocities, etc., will always remain in their original stage on the seismic section; this will remind or indicate to the final analyst that the solution may have been dependent on one or more of these factors.

The seismic sections are useful in foreign and offshore work where time is limited. The easily air-mailed seismic section will keep the home office closely abreast of all up-to-date structural developments.

**Office study . . .** The preceding discussion has all been limited to the seismic section made in the field for immediate use without laboratory or elaborate processing. Fig. 5 shows a seismic section made from a magnetic tape played back through a dual camera similar to that shown in Fig. 1.

Fig. 6 shows a simple seismic section treatment to old records for quick review and filing convenience. The faulting below 8,000 ft. could be considered too deep or segmentary to be plotted on the conventional uncluttered section; however, the presentation on a seismic section is fairly indicative of faulting.

The seismic section as illustrated clearly indicates the negative or normal sections; it brings to focus the subtle usually deeper fault tracks or anomalies; it eliminates the human element factor of selection; and, most important, it offers common meeting ground for the geological and geophysical minds. In the very near future industry, which is fast converting to tape recording, will rely almost completely on the seismic section; and the tedious processing of the large conventional records will be restricted to special critical lines, if not done away with altogether.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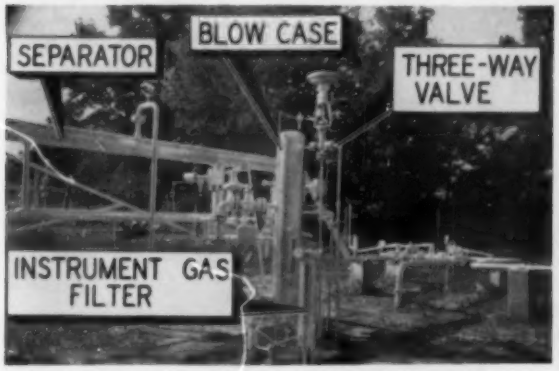
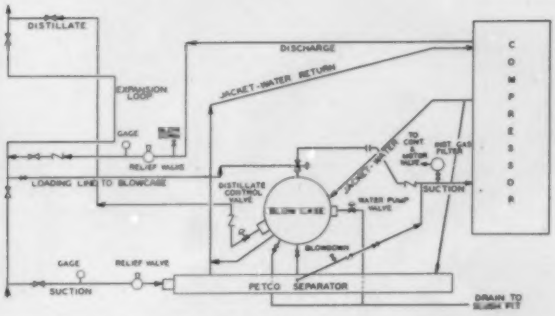



**BLOW-CASE INSTALLATION includes a separator and filter which knocks out incoming fluids from the gas.**




**SCHEMATIC DRAWING of the blow-case installation. Incoming gas passes through horizontal Petco separator.**

Separator, filter do the work as . . .

# Blow case provides clean and dry gas

A BLOW-CASE INSTALLATION on an East Texas gas-gathering system is used to provide clean, dry gas to a field-compressor unit. The facilities include a separator and filter which knocks out incoming fluids from the gas before it reaches the compressor. Hydrocarbon liquids recovered in the blow case are returned to the gathering line at a downstream point. Gas used to pressure liquids out of the blow case is vented into the compressor suction line, thereby avoiding waste.

Incoming gas passes through a horizontal Petco separator from where the gas flashes into the compressor suction line. The separator is equipped with a sovabead filter which knocks out the entrained liquids. Clean, dry gas is thereby delivered to the compressor. Use of this plastic filter has prevented valve difficulties frequently experienced in this service.

Liquids from the filter gravitate into the vertical blow case where separation of water and hydrocarbons take place. The blow case is equipped with two liquid-level controllers. These are staggered so that one is actuated by the level of the water in the blow case and the other by the level of the distillate. The lower controller operates to automatically dump water into the slush pit and provides a throttling action to maintain a constant water level.

**Three-way valve . . .** The upper controller is tied in with a three-way valve. When the distillate reaches its predetermined high level, the three-way valve is actuated. High-pressure gas is then able to enter the blow case to displace the distillate.

This gas is pulled off the gathering line through a 1-in. loading line. The distillate is thereby pressured from the blow case back into the gathering line at a downstream injection tap where it commingles with the field gas for transportation to a central separation plant.

When the distillate level has been lowered, the controller operates the three-way valve again which cuts off the incoming gas to the blow case and vents the pressure on the blow case into the suction line of the compressor. Ordinarily, the pressure of the vented gas would be sufficient to actuate safety-relief valves. This has been avoided by placing a restriction nipple in the vent line. This nipple provides a ¼-in. opening on the 1-in. line. Unloading of the blow case takes place across this restriction with no appreciable pressure increase being felt downstream. The slight increase in depressuring time has no effect since distillate accumulation in the blow case is fairly slow.

**Jacket water . . .** A 1-in. line is used to circulate jacket water from the compressor unit to the blow case and separator to prevent the fluids from freezing.

An instrument gas filter is also incorporated in the system. This takes a supply of gas from the suction of the compressor, filters it, and then provides it to the liquid-level controllers and motor valves.

## Stop current surges with arresters

. . . Houston meeting provides answers

NOTE TO PIPELINERS: Install lightning arresters and you can stop worrying about current surges messing up your equipment.

These modestly priced devices, when attached to selenium rectifiers used in cathodic-protection circuits, will protect your installations from all but a direct hit.

They also can be used effectively to protect microwave circuits as well as generating equipment.

These facts emerged from a round table and floor discussion at the twen-

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## Pipeline Patrol

ty-ninth annual conference of the Petroleum Electrical Association and Petroleum Electric Supply Association held at Houston.

The arresters can be used in several ways. Some companies install them just across the d.c. output of the rectifier. Others use them across both the a.c. input and the d.c. output of the rectifier. They can be used in parallel with capacitors to provide even better protection.

**Some cases in point . . .** Cities Service Gas Co. experienced the loss of several selenium rectifiers over a period of time. The arresters were installed across both input and output and no rectifiers have since been destroyed either from lightning or other types of current surges.

**. . . Southeastern Pipeline Co.** had a similar experience. It was losing 12 to 15 rectifiers per year due to lightning surges. Arresters were installed on the d.c. side of the rectifiers and a low-voltage arrester in parallel with a capacitator was installed on the input side. The result—no rectifier loss in 6 years.

**. . . El Paso Natural Gas Co.,** meanwhile, finds the use of arresters on the d.c. output alone quite satisfactory. The area traversed by its pipelines is especially critical for rectifier protection. Soil resitivity is high, and current will travel long distances along the line with high potentials building up between areas. Lightning striking within several miles of a rectifier can severely damage or destroy it. Use of low voltage arresters—175 volts—has eliminated El Paso's difficulties.

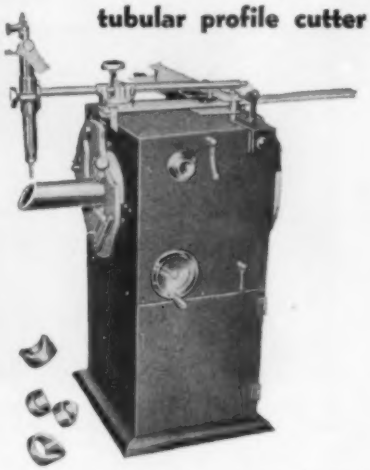
**. . . Tennessee Gas Transmission** Co. had a lightning strike completely gut some radio equipment. The effects were felt not only at the station but also on the office radio. The switchboard used on the generating equipment also was seriously damaged. The solution here was to put arresters on the buss bars of the generating equipment. These were installed along with capacitors to improve the performance. Capacitors are especially beneficial when installed with arresters on microwave circuits.

Lightning doesn't have to strike the ground near a pipeline to set up a surge, one panel member noted. Bell Laboratories proved that a discharge from cloud-to-cloud paralleling an underground conductor will produce some charge.

**The general concensus . . .** The arrest-

woerner

**tubular profile cutter**



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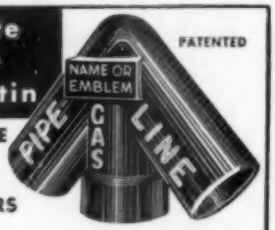


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## After 17 years this Mission Plug Valve is ready for another long period of service

THIS MISSION PLUG VALVE bears the serial number 100. It was built in 1940 and for the past 17 years has served on the fill-up line of a blowout preventer on a South Louisiana rig.

It is shown here just before it was shipped back to the customer after being reconditioned by Mission. It again carries a new valve guarantee as do all Mission factory reconditioned valves.

Records show that it has been reworked only once during the last 17 years — a record seldom equalled by other types of valves.

Performance like this is not unusual for Mission Valves. Automatic Lubrication literally stops leaks before they start, preventing valve damage and increasing useful life. Because of their long life and freedom from maintenance, Mission Plug Valves are especially suitable for Christmas Trees, gathering systems, cycling plants and pressure maintenance plants.

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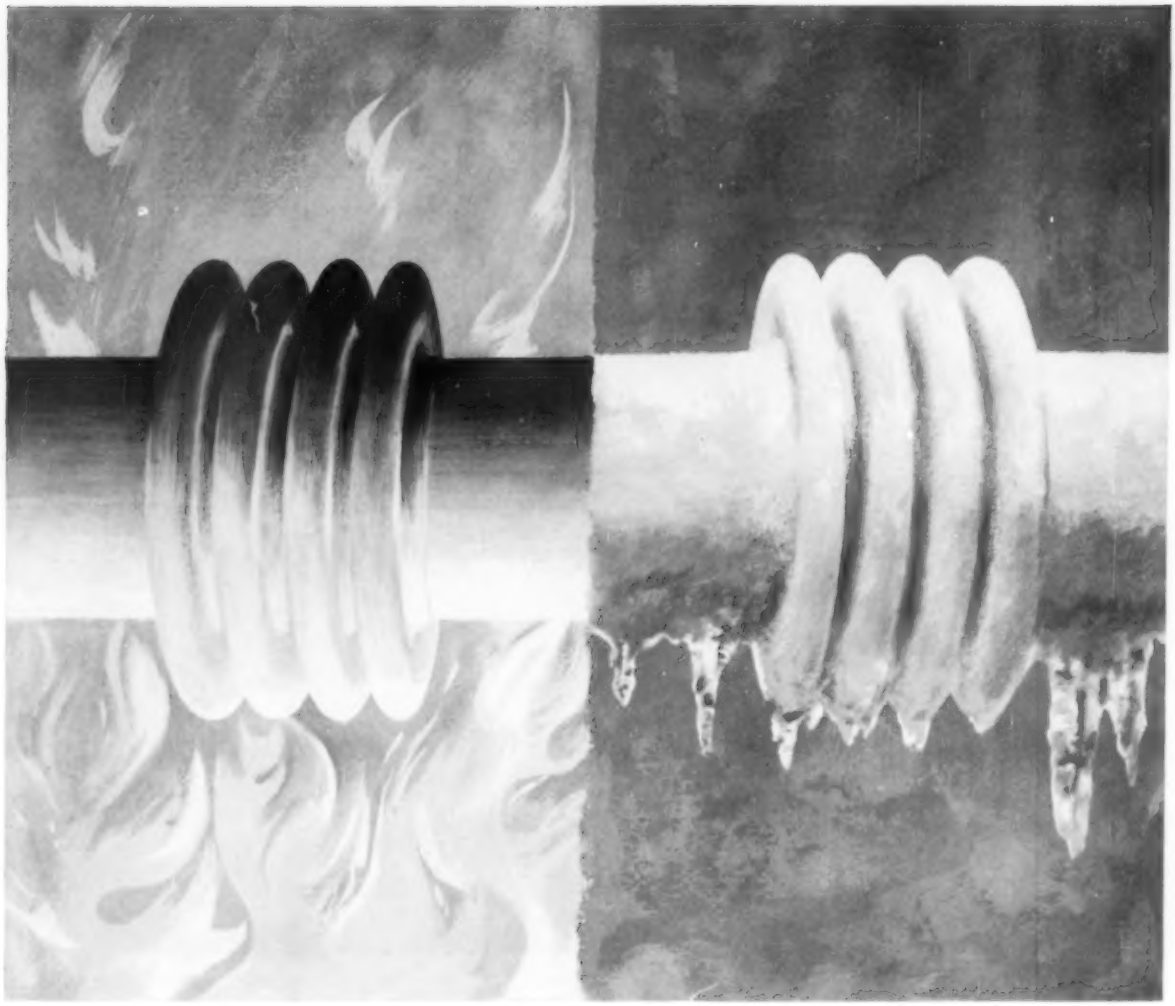

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ers will prove a low-cost answer to your current surge problems.

Panel members were: M. A. Riordan, Rio Engineering Co., moderator; Derk Holsteyn, Shell Oil Co.; M. E. Frank, Tennessee Gas Transmission Co.; H. L. Ingram, Nife, Inc.; C. L. Woody, United Gas Corp.; and C. Mercer, Southwestern Bell Telephone Co.

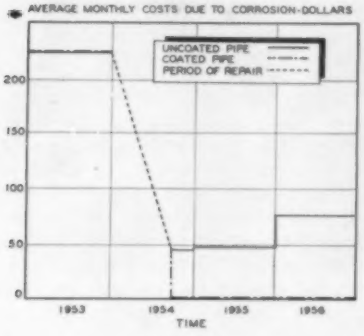



Fig. 1.

## Internal Coating Saves Pipe From Corrosion

INTERNAL PIPELINE MAINTENANCE CO., Odessa, Tex., coated several million feet of pipe between 1953, when it started operations, and January 1, 1957. And the 365 coating runs made had an unusually high success factor of 98.5 per cent.

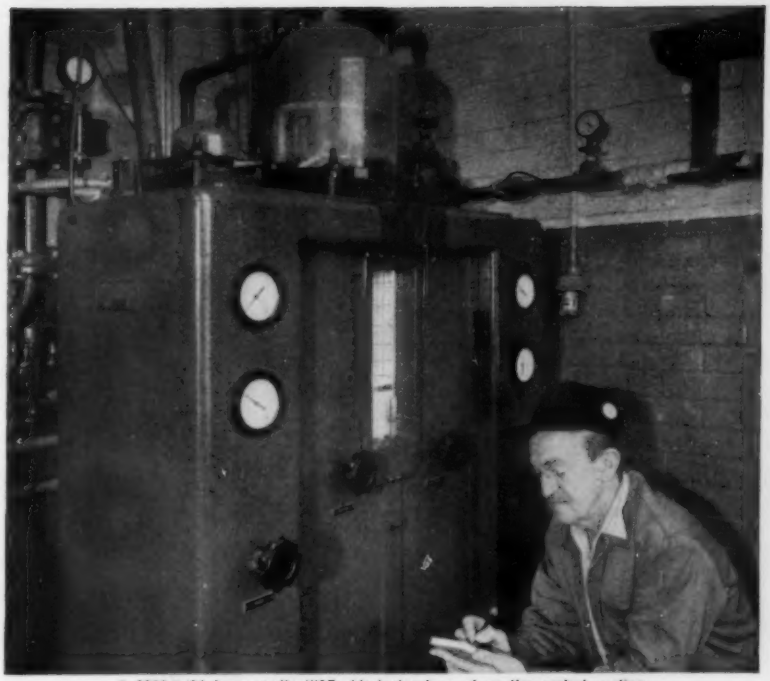
Some crude lines have been coated internally for paraffin control, but the main purpose has been to stop corrosion. Evidence indicates that where a satisfactory coating was applied, complete protection has resulted.

**Corrosion control . . .** Four years ago, in one West Texas field, average cost of repairs due to corrosion of a sour-crude gathering system was 2.8 cents per barrel, or more than half the gathering fee. Some $54,000 was spent for repairs, including $14,000 for cleaning and coating 20 per cent of the lines. Cost of corrosion repairs dropped below 1 cent per barrel, although the unprotected pipe developed leaks and started costs rising.

Average monthly cost of repairs due to corrosion fell from $220 in 1953 to $43.20 the latter part of 1954 (see Fig. 1). Cost of the coating was paid out in 14 months.

Rust particles from a potable water

Digested from "How Successful Are Internal Coatings and Why," by J. C. Watts, Internal Pipeline Maintenance Co., Odessa, Tex., presented March 14, 1957, at National N.A.C.E. Conference, St. Louis.



A 6000#/24 hr. capacity W&T chlorinator is used on the central cooling water system at Marcus Hook, Penna. refinery of Sinclair Refining Company.

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Water used for cooling operations at the Marcus Hook refinery of Sinclair Refining Company is chlorinated to prevent slimes from fouling plant units and lowering cooling efficiency.

Chlorination of the system is accomplished by one **W&T** chlorinator operated from a program control panel. The control automatically starts and stops chlorination in accordance with a preselected schedule. Slime growths are eliminated in the cooling units without the need for continuous treatment.

For information about **W&T** chlorination for slime elimination write for Bulletin CD-43.

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## Pipeline Patrol

line were destroying effectiveness of beds of zeolite softeners. Corrosion had to be stopped or costly filtering equipment installed. The line was internally coated in place with an epoxy resin in February 1954. The softeners have since escaped contamination.

Coating of water-flood distribution systems has stopped corrosion in lines pumping highly corrosive water. In one system where bare steel developed leaks in 60 to 90 days and inhibitors offered little help, coated lines ended all trouble.

**Paraffin mitigation . . .** Internal coatings also are successful in mitigation of paraffin deposition in tubing and flow lines. One case involved a line that had to be steamed at least once a month before coating. It has not been touched in more than 6 years since coating. Another graphic example of coating success was on flow lines through which a rubber ball was run every 24 hours. The line had to be steamed if a day was missed.

When an automatic battery was installed, coating of lines and headers made automatic operation possible. Automatic features of the battery depended upon pressure changes to operate and it was essential that no pressure increases be caused by line restrictions. Besides making the operation feasible, the coating was paid out in 3 months.

**Increased throughput . . .** No lines have been coated exclusively to increase capacity, but this has been a definite side effect in many cases.

A 92,000-ft., 14-in. water line had a 26 per cent increase in capacity at reduced pumping pressures after coating in place. The saving in power costs alone will pay for the coating in 5.3 years.

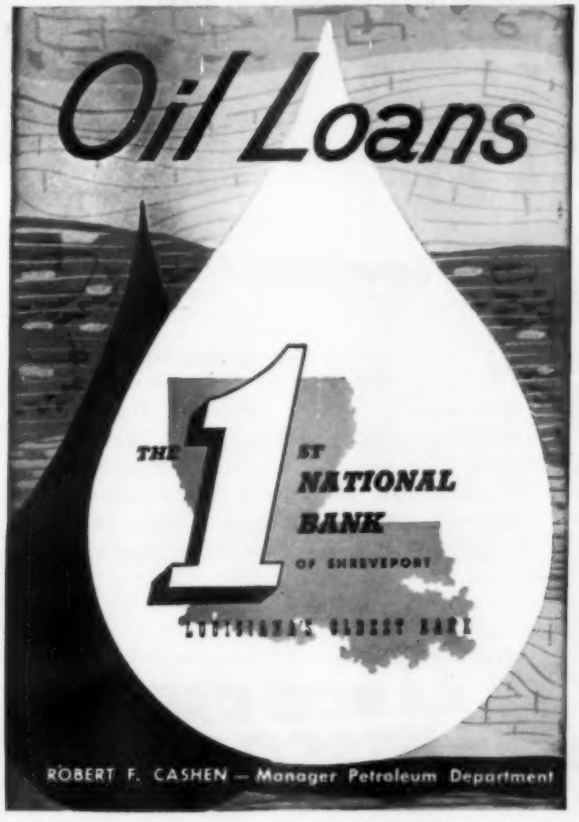
A 20-in. gas line had severe corrosion and scale buildup, and besides developing leaks, wouldn't handle the necessary volume of gas at the desired pressure. Before cleaning and coating, efficiency dropped to 46.7 per cent, as computed by the Panhandle Formula. After coating, efficiency rose to 98.7 per cent (see Table 1).

**TABLE 1—EFFECT OF INTERNAL COATING ON 20-IN. GAS LINE**

| | Before coating | After coating | Increase (+) or decrease (—) |
|---|---|---|---|
| Inlet pres., psi. | 51 | 45 | — 6 |
| Discharge pres., psi. | 21 | 39 | +18 |
| Pres. drop, psi. | 30 | 6 | —26 |
| Throughput, M.M.c.f. | 29.5 | 29.5 | 0 |
| Efficiency, % | 46.7 | 98.7 | +52 |

**WORKING ON THE HEELS OF THE LOWER-IN CREW** a one-man-operated Cleveland 190 helped to keep this United Gas pipeline job moving along, leaving no open trench at the end of any day's work. A report from Fowler-Tatom Pipeline Contractors states, "The Cleveland 190 backfilled trench almost as fast as a man can walk." Where trenches were water-filled the 190 tied down pipe then doubled back to complete the fill and finished it off with a neat clean-up job. Much of the 16-mile line from the Chocolate Bayou field to the main line near Webster, Texas, cuts through rice-growing farmlands, so the 190 had to pull down big heavy spoil banks of wet sticky gumbo much of the way.

THE CLEVELAND TRENCHER COMPANY, 20100 St. Clair Avenue, Cleveland 17, Ohio



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Carbon Monoxide Boiler at Sun Oil Company's Toledo refinery.

# 3 B&W Carbon Monoxide Boilers Save Fuel For Sun Oil

Sun Oil Company has three B&W Carbon Monoxide Boilers in its refineries at Toledo, Ohio, and Marcus Hook, Pa. All are used with Houdriflow cracking units. The first boiler went on stream at Toledo three years ago. The second, at Toledo, and its twin at Marcus Hook, are of the oxycatalyst type.

The three B&W "CO" Boilers are effecting substantial fuel economies at both refineries.

**Cracking units** at Sun Oil, like others using B&W "CO" Boilers, are completely independent of outside steam and energy sources at all times. Whether or not the cracking unit is operating, steam is always available.

**Extended, sustained service** has proved the reliability, efficiency, and economy of B&W "CO" Boilers in refineries throughout the nation. They are flexible in design and arrangement to meet varying refinery conditions. B&W engineers can show you how a "CO" Boiler can serve your refinery, regardless of size, steam pressure and temperature requirements. The Babcock & Wilcox Company, Boiler Division, Dept. OGJ-2, 161 East 42nd Street, New York 17, N. Y.

G-824 CO

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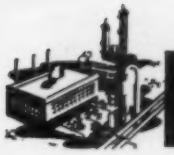
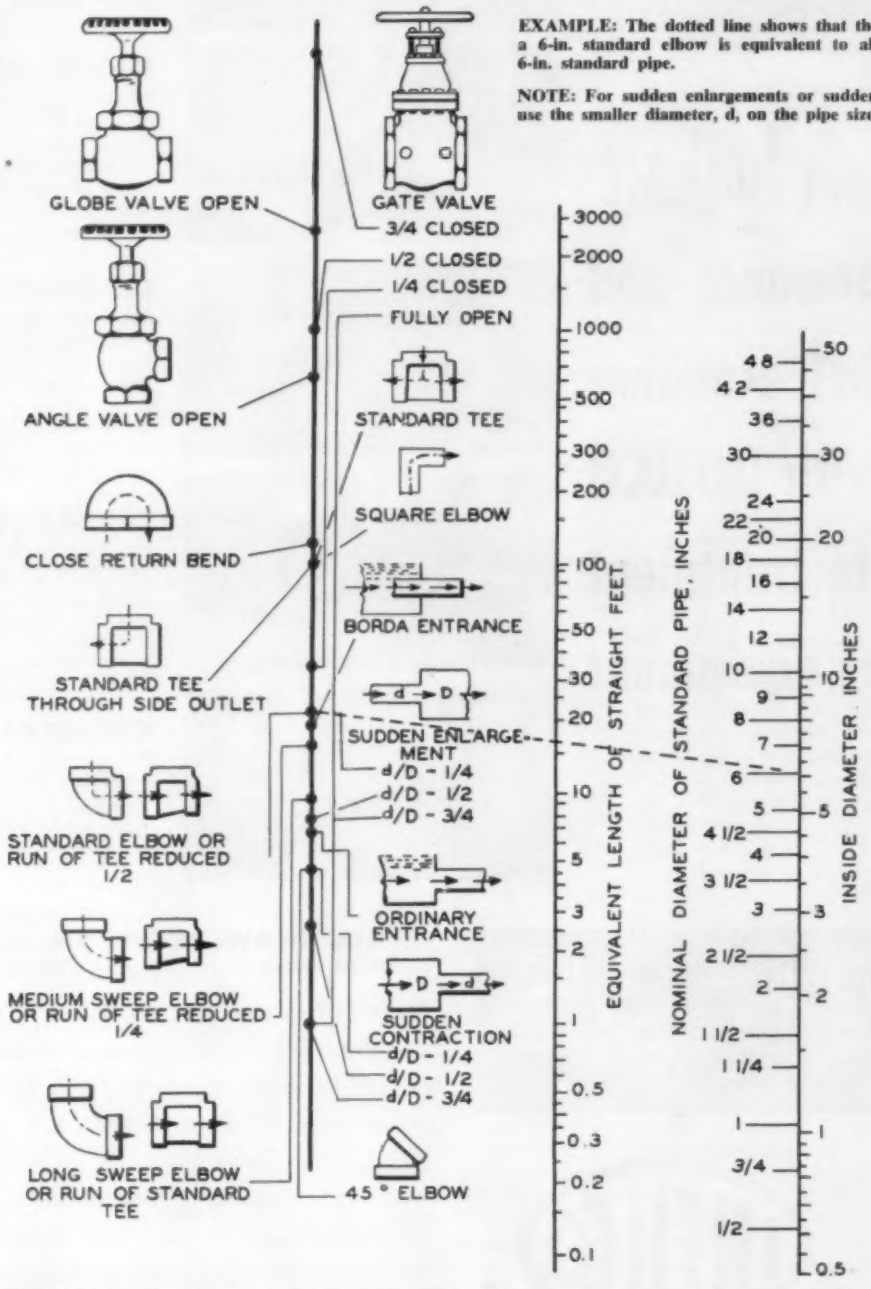
BOILER DIVISION





JOB IMPROVEMENT FOR THE PROCESS FOREMAN—93

# Resistance of Valves and Fittings to Fluid Flow




**EXAMPLE:** The dotted line shows that the resistance of a 6-in. standard elbow is equivalent to about 16 ft. of 6-in. standard pipe.

**NOTE:** For sudden enlargements or sudden contractions, use the smaller diameter, d, on the pipe size scale.

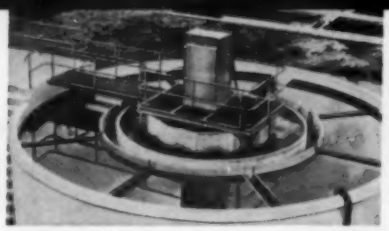
**THIS CHART** taken from process-training-program manual, Baton Rouge, La., refinery of Esso-Standard Oil Co. (Chart courtesy of Crane Co.) Fig. 3a.

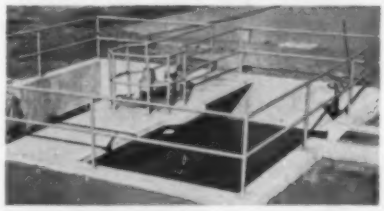
IN THE MINIMUM SPACE

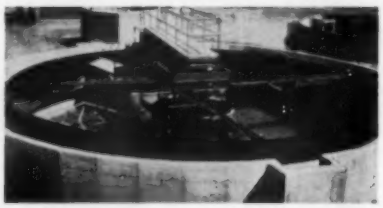
...FOR LOWER

INSTALLED COST—

# ...YOU get *highest* performance and *greatest* economy with INFILCO waste treatment equipment







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A high-rate, multi-purpose unit for rapid, continuous biological oxidation and clarification; efficient and stable operation at high loads. BULLETIN 6510

## CYCLATOR® clarifier

. . . for effective treatment of industrial waste waters where the concentration and dewatering of voluminous sludges are involved. Clarification by chemical and mechanical methods with solids recirculation in a single compact unit. Three types of surface skimmers available for different applications. BULLETIN 850

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**For simple clarification or thickening by sedimentation.**

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Packaged Compressors

Last of two parts

# Packaged Compressors Minimize Cost Risk

By E. C. Mannas

PRACTICALLY all of the oil fields now being developed are fracture treated by one method or another and thus a high rate of initial production quickens the depletion period of the field. By the time production history can be obtained for a short-life reserve, so much of the gas may have been vented it is then uneconomical to install compression facilities. Short-life reserves prompt an early installation of compression facilities before the field is developed and before production history is obtained from which to extrapolate the future requirements of compression horsepower.

**Risk . . .** In installing compression facilities in an undeveloped field, a risk of the investment is involved. However, the risk may be minimized by the use of packaged compressors as the units have a high salvage value of $170 per horsepower as compared to $50 per horsepower for a stationary installation.

### Flexibility

Packaged compressors may be equipped with compressor cylinders which allow a wide range of discharge pressures. The average oilfield operation will permit a suction pressure of 15 to 30 psig. and the low-stage cylinders may be designed for these suction pressures. Gas-transmission lines have operating pressures from 300 t 1,000 psig. and for a packaged compressor to be portable or moved from field to field, it should have flexibility to make deliveries within this range.

The multiple-cylinder units usually have four or more throws which may be used for compressor cylinders. Design of the low-stage-compressor cylinders for suction pressures of 20 to 30 psi. usually requires two cylinders.

Author is regional manager, natural gasoline, Continental Oil Co., Oklahoma City.

With discharge pressures in the 300 to 500-psi. range, one additional cylinder may be used to load the engine. A unit equipped with three such cylinders may then be moved to a field requiring a discharge pressure of 800 to 1,000 psi. and an additional or fourth cylinder installed for the high stage. The addition of the fourth cylinder will require clearance pockets on the low and intermediate cylinders to unload these cylinders for the horsepower requirements of the high cylinder.

**Intermediate cylinders . . .** If a unit is initially installed in a field requiring the higher discharge pressure and the gas reserve appears to be doubtful, then the unit may be equipped with low and intermediate cylinders sized to load the engine. These cylinders would then be pocketed to unload the engine for horsepower requirements of the high stage. On some units, it may be necessary to change the crankshaft counterbalance weight when removing or installing a high cylinder. However, the high-stage piston is small usually and its weight insufficient to require rebalancing of the unit. Sizing of cylinders on units with more or less than four throws for the compressor cylinders will allow similar flexibility of a unit.

### Operation

Operation of the packaged compressor is similar to the stationary unit. The control equipment on the units protects the engine from damage due to overheat, low oil pressure, damaging vibrations, and overspeed. Many units are free wheeling with only a lease switcher to add oil to the crankcase and oil lubricator each day and to inspect the unit for spark plug failure, proper fuel injection, failure of liquid-drain controls, loose fan belt, and other preventive maintenance.

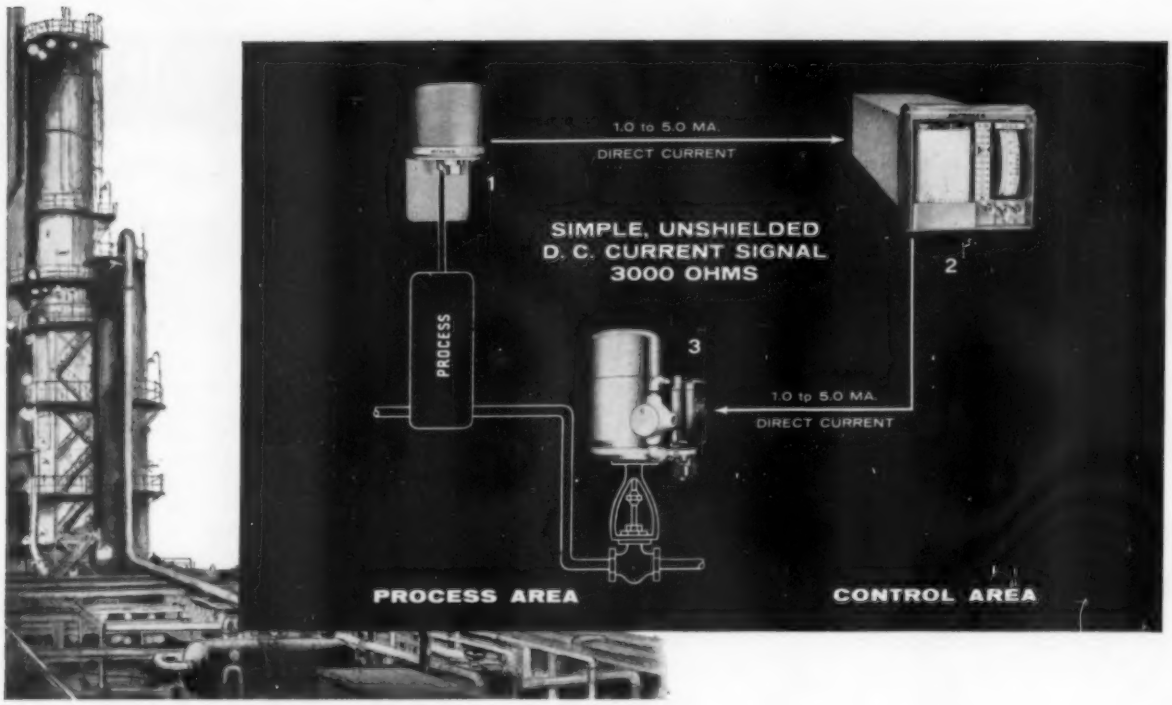
Sheds may be installed over the packaged compressor to protect the unit from the elements; however, the enclosure of the unit in a shed adds the cost of a crane to the installation and may be a fire hazard to the installation and operating personnel.

All buildings or sheds tend to build up the concentration of gas from leaks. A source of ignition is ever present from the engine ignition system and exhaust to cause an explosion or fire at any time the gas concentration reaches the combustible limits. Spark plug shields may be installed on units to prevent shorting of the spark plugs when it rains. Certain governors are not waterproof and it is necessary to hood the governor on these units to keep rain water out of the hydraulic system in the governor.

If the inlet scrubber on the skid is an efficient scrubber, with a mist extractor and equipped with a large liquid dump seat, it should have capacity to dispose of liquid which might come in with the gas. The previously mentioned four packaged compressors have been operated with only the skid inlet scrubber. During the operation it has been found that the scrubbers are sufficient to remove inlet liquids.

At times, oil wells have overflowed into the system and the scrubbers have dumped the liquid without tripping the high-liquid-level shutdown switches. There have been small quantities of oil found in the valves, when working on the compressors, but it has not been determined whether this is a carryover of oil from the scrubber or heavy ends condensed from the gas by compression.

The increasing cost of compression equipment and short-life gas reserves now being discovered are a challenge to seek low-cost ways of compressing gas. The packaged portable compressor may be an economical solution to the compression of oil-well gas.




# Let's look at a typical control loop of the 'American-Microsen' *ELECTRONIC PROCESS CONTROL SYSTEM*

This all-electronic dc system of miniature-type units assures the instrument engineer of 1) better control; 2) greater flexibility; 3) lower initial costs; 4) lower operating costs. The typical control loop above demonstrates the simplicity and functions of the system.

**1. *Transmitter.*** 'American-Microsen' transmitters are used for measuring pressure, temperature, differential pressure, liquid level, flow, and other process variables. The "Microsen" balance creates a stable dc signal for long distance transmission. Transmitters have no bearing pivots or linkages — assuring sensitivity and repeatability of measurement. Small size is made possible by printed circuitry and miniaturized components. The unit can be installed on meter piping, pipe pedestal or vertical surface.

**2. *Controller.*** A single unit combines all functions of measuring and recording or indicating the input signal; producing the control signal; and allowing manual-automatic process operation. Separate plug-in chassis provides the following functions: *A.* Records or indicates process variable. Strip or card chart recorder chassis available. *B.* Produces proportional, reset and rate control actions to regulate the variable. All control settings are calibrated. *C.* Permits switching to manual operation during start-up or emergency conditions, with true "bumpless" transfer from manual to automatic control.

Transistorized design increases reliability and service life. Miniaturization and consolidation of control functions reduces panel cost and wiring expense.

**3. *Electro-Hydraulic Control Valve Operator.*** A power unit with position feedback that operates slip-stem control valves. No compressed air is needed. Mountable on standard yokes supplied with conventional slip-stem control valves with bodies of single or double-seated construction, with V-port, parabolic, needle and equal percentage plugs, including valves of 4" stroke, and force available up to 3,250 lbs.

Where required, the American-Microsen Electro-Pneumatic Valve Positioner or the Electro-Pneumatic Transducer can be supplied.

In automating your processes for higher product quality and greater operating economy, you want the better control and simplified servicing provided by the American-Microsen Electronic Process Control System. We invite you to meet with one of our sales engineers to determine the best equipment for your service. Write for literature.

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MAKERS OF 'AMERICAN-MICROSEN' ELECTRONIC INSTRUMENTS FOR MEASUREMENT, TRANSMISSION AND CONTROL

By W. L. Nelson
Technical Editor

# QUESTIONS ON TECHNOLOGY

## Drilling Heater Tubes During Inspection

**The practice of drilling holes in tubes to determine the metal thickness and then welding the holes does not seem to be a good practice. Is this a common practice and what other methods are used? H.E.**

Although drilling and plugging may lead to induced stresses or to focal points for corrosion, it has the major advantage of disclosing the exact actual thickness of the metal. It is therefor used in determining the thickness at critical points in lines, tubes, vessels and other equipment. In avoiding residual stresses caused by drilling, plugging, and welding, the pipe is sometimes cut entirely in half and then rewelded.

The American Petroleum Institute (Recommended Practices for Refinery Inspections) mentions visual inspection, hammer testing, trepanning, or core drilling (for welds), drilling, and calipering. Obviously, the visual inspection and calipering methods are of little use in determining the wall thickness of tubes and even hammer testing can be misleading if deposits of coke or corrosion debris cling to the tube.

The Audigage *(Wilson, T. C., The Oil and Gas Journal, March 21, 1955, page 289)* is a self-contained portable instrument by which the thickness of steel and other types of tubes can be determined by sound. A thin film of oil or grease is applied to the surface (it must be relatively smooth) to provide a good ultrasonic coupling between the metal and the crystal of the instrument. Rough or heavily painted surfaces must be filed or ground. The method is extremely accurate except when the sound is modified by deposits, and at thicknesses below ⅛-in. the measurements are difficult to read.

The Penetron *(The Oil and Gas Journal, June 30, 1945, page 106)* is another instrument for determining the thickness of vessel or pipe walls. It employs gamma rays. The combined thickness of metal, coke, or scale is measured and hence the operator must know whether the line is clean, or must know the extent of the deposits.

The extent to which drilling and plugging is practiced cannot be stated. However, in discussing the various other methods of determining wall thickness, authors usually modify their recommendations with such statements as: "It is not intended that either of these instruments should be used in lieu of the older proved methods[1]. "With these (methods) it is possible to determine the thickness — almost eliminating the need for drilling through the wall"[2]; "They should not displace the older methods of drilling and plugging, calipering . . . "[3].

**References**

1. Wilson, T. C., Reduce Unscheduled Shutdowns, The Oil and Gas Journal, March 21, 1956, p. 289.
2. Samans, W., Keep Those Pressure Vessels Safe, Pet. Processing, May 1955, p. 666.
3. Wilson, T. C., Nondestructive Testing of Refinery Equipment, Pet. Engineer, July 1955, p. C-16.
4. Weiss, E. L., Inspection of Refinery Vessels, The Oil and Gas Journal, December 14, 1953, p. 108.
5. Anon., Penetron Quickly Determines Steel Thickness . . . , The Oil and Gas Journal, June 30, 1945, p. 106.
6. Newcomb, F. L., Inspection of Oil Refinery Equipment, Ref. Nat. Gaso. Mfg., May 1935, p. 211.

## Cost of Dewaxing Plants—Revised

**The costs for dewaxing plants shown in your answer of October 29, 1956, appear to be high by about 50 per cent. At the moment we are designing several such plants and the costs are lower than you show.—W.K.**

Such comments are most welcome. The costs suggested by the contractor are shown as triangle points in Fig. 1 and they appear to be a good average of all of the data available to this department. Texaco Development Corp. (135 East Forty-second Street, New York), licenses the ketone dewaxing process and the above comment came from contractors building such plants.

Very little information is available, and some of the points shown in Fig. 1 date back to even 1934. All of the points were converted to the year 1946 for comparison, by using the Nelson Refinery Construction Cost Index.

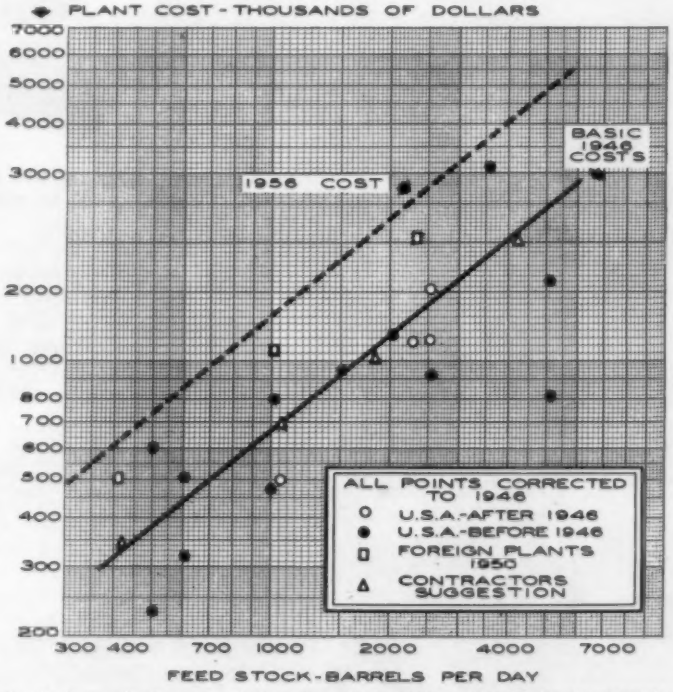


**Fig. 1—Approximate costs of dewaxing plants, 1946 and 1956 (mainly M.E.K.).**

# EXTRA!

## EXTRA!

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# Among the Drilling Contractors

## Here's the Story of Japan's Deepest Drilling Rig

Japan's first rig for deep drilling is now at work on its first well near the Japan Sea about 10 km. (6¼ miles) from Nagoaka on the opposite side of Honshu Island.

Officers of the Teikoku Oil Co., owners of the rig, and a number of guests traveled through deep early spring snow to attend the ceremonies which are traditional to operation of a new rig in Japan. Religious services conducted by Shinto priests preceeded the spudding in.

The rig is a National Type 110. It includes a four-section drive group with Superior PTD-6 engines and Gyrol fluid drives. The rig is designed for wildcat drilling below 13,000 ft. Present wells in Japan have a maximum depth less than 6,000 ft.

**Japan's first rig for deep drilling is shown as it looked at the time of its spudding-in ceremony. Early spring snow hampered the religious services that preceded the spudding in. The rig is a National Type 110.**

**Wheless Drilling Co.** has contract for a 12,000-ft. wildcat in Terrebonne Parish, South Louisiana, for Union Producing Co. The 1 Mary Ellender et al will be drilled in 42-18s-19e, 1½ miles south of Lake Long field.

**El Dorado Pipe & Supply Co.,** El Dorado, Ark., will handle contract for a new 3,150-ft. Tuscaloosa wildcat 1⅜ miles west of Kinard in Union County, South Arkansas. The well will be J. S. Beebe, Trustee, and R. S. Rushing, Trustee 2 Olin in SE SW 34-17s-14w.

**M & M Drilling Co.** will drill a 10,600-ft. well in Napoleonville field, Assumption Parish, South Louisiana, for Wilshire Oil Co. of Texas. The 1 Ougas and LeBlanc will be drilled in 40-12s-13e.

**Signet Drilling Co.,** Corpus Christi, has a new wildcat operation in the East Mathis area, in northwestern San Patricio County, South Texas. It is a contract job for A. C. Vernor, of Houston, at 1 Guenther, in Section 8 of the George H. Paul Subdivision, of the J. J. Welder ranch. A 6,100-ft. test is planned.

**Nye & Snell Drilling Co.,** Hays, Kans., is under contract to Ashland Oil & Refining Co. for a 5,500-ft. test at a wildcat location 3½ miles east of Sitka, in Clark County, southwestern Kansas. Location is at 1 Kinsinger, in 15-33s-21w. It is about a mile north of North Harper Ranch pool.

**Gilmour Drilling Co.,** Alice, Tex., is on a new wildcat operation 5 miles northeast of Realitos, in southern Duval County, South Texas. It is a contract job for Blaine Dunbar, of Longview, Tex. Location is on Clara Driscoll estate land, in Section 486, Ball Ranch


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Truscon "Budget Buildings" now are available for immediate delivery in widths of 32, 36, 40, 44, and 48 feet . . . 12- and 14-foot heights . . . lengths as long as you want to make them. All elements are engineered for fast on-site erection. When erected, you have a fire-resistant building that's smartly styled, and designed for community acceptance. Dis-assemble, move, and re-erect it where and when you please.

Your "Budget Building" order will be filled fast from "off-the-shelf" stocks of pre-engineered materials. It will be shipped to your site as a package—all roofing, siding, windows, doors and hardware included. When you need a building and you're tied to a budget, give Truscon a call. Send coupon for facts.

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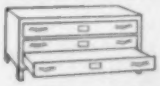
Model E-28 Electric Log Cabinet



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## K. L. Kellogg Announces Wholly Owned Subsidiary

K. L. Kellogg, president of K. L. Kellogg & Sons, well known California

**R. C. Sharp has joined Kellogg Overseas Corp. as vice president. The new company was formed recently by K. L. Kellogg.**

drilling contractor, announces the formation of a wholly owned subsidiary, Kellogg Overseas Corp.

The new corporation has been organized to engage in contract drilling outside the United States. R. C. Sharp, formerly vice president and director of Drilling & Exploration Co. of Delaware, Inc., has joined Kellogg Overseas Corp. as vice president. The new corporation will maintain offices in Compton, Calif.

**Continental Drilling Co.** has contract for a 10,000-ft. wildcat in Jefferson Parish, South Louisiana, for Signal Oil & Gas Co. The 1-A Lillian Jones will be drilled in 48-16s-24e, 2 miles southwest of Alliance field and 3 miles north of Lafitte field.

**Penrod Drilling Co.** has been awarded contract for a Jefferson Parish, South Louisiana wildcat, the F. A. Callery, Inc. 1 A. M. Barnes et al. in 44-14s-24e, 1 mile east of the Marrero discovery well. This new well will go to 10,200 ft.

**Mercury Drilling Corp.** will handle contract for a 3,800-ft. Travis Peak wildcat 1½ miles southwest of Urbana field in South Arkansas. The well, 1¾ miles south of the town of Urbana, Ark., is George Belchic, Jr., and Mercury Drilling Corp. in C E½ NE SW 21-18s-13w.


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## Wheel Ditcher Digs at 28 Ft. per Minute

Features of this new Model 774 crawler-mounted wheel type of ditcher include: (1) a 5 ft. 6 in. digging depth and widths, adjustable in 1-in. increments, from 18 to 30 in., (2) hydraulic-power transmission, (3) flexible connections between the chassis and digging wheel, (4) an electric, magnetically actuated overload release clutch, and (5) a reversible, hydraulically driven spoil conveyor.

The forward crowding speeds on the ditcher are controlled through a patented hydraulic drive. By moving a valve, the operator can instantly select forward speeds ranging from 0 to 28 ft. per minute. These speeds are independent of the digging-wheel speeds, controlled separately through a mechanical transmission.

This infinite combination of crowding and digging wheel speeds reportedly lets the operator overcome varying digging conditions by bringing to bear optimum efficiency and application of the machine's horsepower, in the proper degree to suit the conditions. **Write or call: Barber-Greene, 400 North Highland Avenue, Aurora, Ill., for details on Model 774 ditcher.**

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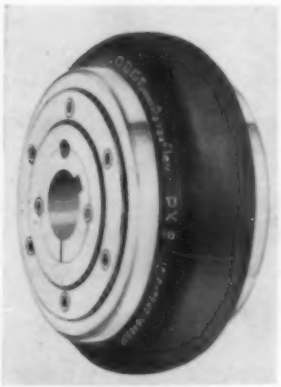

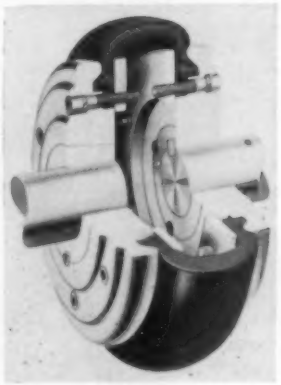

## Flexible Coupling Uses Rubber Tire to Cushion Shock

The ability to handle angular misalignment, parallel misalignment, and end-float, in any combination is one of the advantages claimed for this new Para-Flex flexible coupling. The flex-

Send this **Showcase Coupon**

to the **Manufacturer** of the item in which you are interested. See name, address, and equipment name and/or model, in bold-face type at end of description.

NAME AND/OR MODEL NUMBER.....

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Described in *OIL AND GAS JOURNAL - Issue of June 17, 1957

NAME.....TITLE.....

COMPANY.....

ADDRESS.....

CITY.....STATE.....

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# There's a CORBAN to Combat CORROSION in *Any* Well

The waste and expense of corrosion can be cut effectively by Corban®, Dowell's family of polar-type corrosion inhibitors. There is a type of Corban to combat practically any internal corrosion problem. Corrosion from sour crude, sweet crude, gas condensate or water — all can be checked by applications of the proper type Corban.

Corban is available in several liquid formulas, some concentrated and others ready-to-use. On most flowing wells Corban is applied with an injector or lubricator; in pumping wells, it is simply poured down the annulus. A new method of using Corban in high-pressure wells is to squeeze it into the producing formation. This squeeze technique using Corban has given continuous protection against corrosion for a period of months. Or, there is Corban in stick form to provide protection for wells that cannot be treated with liquid inhibitors because of the way they are equipped.

Corban adheres to internal metal surfaces, forming a protective film. This film shields the casing, tubing, valve connections and pumping equipment against the corrosive action of well fluids.

Find out how Corban can help you. Your Dowell engineer will tell you which type of Corban and treating technique suits your well. Call any of the 165 Dowell offices in the U. S. and Canada; in Venezuela, contact United Oilwell Service. Or write Dowell Incorporated, Tulsa 1, Oklahoma.

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Over 70 *Locations in the United States and Canada*

# McCullough® REPORTS TO THE OIL INDUSTRY

Service *Anywhere Anytime*

*New Services • • • New Tools • • • New Methods • • • Outstanding Results*

**LITERATURE**

You can obtain full information on the McCullough Magna-Tector (Free Point Finder) and String Shot Back-Off by writing to McCullough Tool Company, 5820 South Alameda Street, Los Angeles 58, California. We will send your literature by return mail.

## *Magna-Tector—Chemical Cutter Save 520′ More Tubing Than Expected*

Many times the use of McCullough's Magna-Tector (Free Point Finder) more than pays for itself by the recovery of additional pipe.

This Texas oilman was working over an old well. Tubing was stuck and rods had parted at 1727′. He called for a McCullough Chemical Cutter, intending to cut the 2″ tubing at 1200′. After the advantages of the Magna-Tector had been reviewed with the operator, he decided to run it before making the cut.

Magna-Tector readings showed the tubing to be free down to the top of the rods at 1727′. A 1¾″ O.D. Chemical Tubing Cutter made a cut at 1720′, giving the operator 520′ of unexpected recovery. He was well pleased with the efficiency of McCullough Services.

## McCullough Back-Off Service Helps Recover Pipe in 54° Angle Hole

### *Tough Fishing Job Simplified by Magna-Tector and String Shot Back-Off—Speeds Recovery of Stuck 4½″ Drill Pipe and 7⅝″ Wash Pipe*

The efficient performance of McCullough's Magna-Tector (Free Point Finder) and String Shot Back-Off in this California oilwell speeded the successful completion of a complicated pipe recovery job.

This was a 54° angle, directional well. While drilling at approximately 3700′, 4½″ O.D. drill pipe became stuck. Operator called for McCullough Back-Off Service at once. The Magna-Tector found the lowest free joint at 3258′. A String Shot backed the pipe off at that point.

Operator ran in with 7⅝″ O.D. wash pipe and washed over the stuck string to slightly below 3500′. While coming out of the hole, wash pipe also stuck. Washover shoe was at 2914′.

McCullough again ran in with the Magna-Tector, locating the free point of the wash pipe at the driver sub at 2516′. A String Shot backed the wash pipe off at this point and the free pipe was removed from the hole, leaving 400′ of wash pipe in the well.

**PIPE STUCK? DON'T GUESS!**

**Call McCullough—Recover ALL free pipe in a hurry! Magna-Tector accurately locates lowest free point. String Shot Back-Off loosens lowest free joint. Guesswork is eliminated — you recover ALL free pipe.**

Operator then ran through the suspended wash pipe with his 4½″ O.D. drill pipe and screwed into the top of the original fish at 3258′. A third run was made with the Magna-Tector, locating the lowest free point at 3472 feet, and a String Shot backed off the drill pipe. The small amount of drill pipe left in the hole proved to be only lightly held for it was later recovered by rotating and a strong pull. Wash pipe was subsequently recovered by cutting it in four sections and removing the sections with spear and jars.

Time is a very important factor in stuck pipe recovery operations. The longer it remains in the hole the more chance there is that caving or settlings will stick it farther and farther up the hole.

Call McCullough immediately. McCullough's Back-Off Service will aid in fastest possible recovery of all free pipe and will simplify remaining fishing operations.

***The jobs described above are certified to be true field reports of services rendered.***

**McCullough® TOOL COMPANY**

*Cable Address:* MACTOOL

LOS ANGELES
HOUSTON
EDMONTON

# New Equipment

ible member also cushions shock loads and diminishes torsional vibration, thus protecting both the driver and the driven machine.

The heart of the coupling is a tire with synthetic tension members bonded together in rubber. The coupling consists of the flexible tire clamped between two hubs which are mounted on the shafts to be coupled. The flexible member is held between the flanges and clamp rings of the hubs.

Both hubs of the coupling are machined to take Taper-Lock bushings. These give the equivalent of a shrunk-on fit on the shaft and permit quick and easy application to shafts of different diameters without reboring.

According to the maker, the coupling will take angular misalignment up to 4°, parallel misalignment up to ⅛ in., and endfloat up to ☆ in.—contingent upon the size of the coupling and the duration of the conditions. And it will take these simultaneously. The Para-Flex coupling is available in capacities up to 600 hp. at 900 r.p.m. **Write or call: Dodge Mfg. Corp., Mishawaka, Ind., for details on Para-Flex flexible coupling.**

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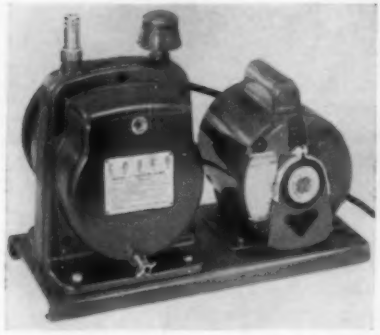

## Redesigned Vacuum Pump Available in Three Models

This high-vacuum pump is one of a completely redesigned line. It is available in three models, known as the Cenco Hyvac 2, 7, and 14, for research and industrial use. The principle of gas-ballast control is offered as standard equipment on the Hyvac 14. It is optional on the Hyvac 7.

A vacuum pump using this feature, according to the maker, is able to pass water and other condensable vapors through the pump and exhaust them with virtually no internal condensation. Gas-ballast pumps are said to be especially suitable in the fields of vacuum distillation and other applications where condensable vapors may be present.

In addition to the low noise and vibration features, the pumps are much faster in operation than the older Hyvac.

The Hyvac 2 delivers a free-air displacement of 20 l. per minute, twice that of the original Hyvac. The Hyvac 7 displaces 70 l. per minute, and the Hyvac 14 displaces 140 l. per minute. All three models have a guaranteed ultimate vacuum of 0.1 $\mu$. **Write or call: Refinery Supply Co., 621 East Fourth Street, Tulsa 3, Okla., for details on Cenco Hyvac pumps.**

## Gasketing Felts Withstand High Temperatures

Temperatures to 400° F. can be handled by these new nonwoven gasketing felts made of Teflon polytetrafluoroethylene fiber impregnated with Teflon resin, according to the manufacturer. The gasketing felts are said to be so resistant to chemicals that they can be boiled in aqua regia or fuming sulfuric acid with no adverse effect.

The new material is expected to stand up well in gasketing under relatively low flange pressures at high temperatures in the presence of all types of

LITTLE JACK
WITH
"BIG STUFF"

A team of these 125-ton hydraulic jacks can move a substructure on an offshore barge in hours instead of days. The custom-made example pictured above has proved it.

This jack is designed to fit into a special beam holder at one end, and to be welded to the substructure at the other. It works off a standard accumulator unit on the barge. It can pay for itself with one move.

Write, wire, or phone Joe Stine, Inc., about hydraulic jacks custom-made for your job.

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# Save thousands of dollars per well in offshore drilling

## with LETOURNEAU mobile platforms

LeTourneau Mobile Platforms are rewriting the cost figures in offshore oil drilling. These completely self-contained units, designed to do the complete job from spudding in to setting production platforms, contribute impressive savings in offshore operations.

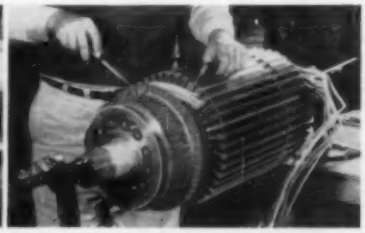
The unique tripod design with its electro-mechanical raising and lowering mechanism permits location changes to be made quickly – in a matter of hours instead of days. And since each spud is independently operated, the platform level can be controlled at the flick of a switch in the event scouring or some other unexpected action occurs.

Other safety features are inherent in the design of LeTourneau Platforms. They have more than ample stability when floating and, because of the open-truss spuds, are able to withstand severe weather and wave conditions when elevated. The hull design also permits the units to be towed safely and easily.

The derrick can be shifted both longitudinally and laterally so that more than one hole can be drilled from any location – another cost saving feature. The derrick can also be transferred onto a permanent platform if required.

Whether you're drilling in the Gulf of Mexico, the Persian Gulf, off the coast of Venezuela or any other area, a LeTourneau Mobile Offshore Platform can be custom designed to your particular needs. Let our engineers show you how we can save you thousands of dollars per well. Write or call today.

**R. G. LETOURNEAU INC**
MARINE PRODUCTS DIVISION
2876 South McArthur Longview, Texas



LeTourneau handles the entire production from pouring steel to final rigging. Photos show steel mill operation and electric motor manufacturing in the Longview plant.

*Write for Brochure*

Write for brochure on the latest LeTourneau Mobile Platform to be placed in service—complete description and photographs. M-106

# New Equipment

fuels, lubricants, hydraulic fluids, and corrosive chemicals.

The unimpregnated felts also appear to have applications for filtration too. Because of their high chemical and heat-resistant properties, the felts are expected to be useful in oil and gas-industry services to provide seals for which currently available gasket materials are inadequate. **Write or call: E. I. du Pont de Nemours & Co., 1007 Market Street, Wilmington 98, Del., for details on Teflon gasketing felts.**

●

## Wide-Span Building Has Low Profile

A roof pitch of 1 in 12 on this new Butler metal building imparts the general appearance of a modern flat-roof design to the finished building. Yet, the low pitch retains the advantages of a gable roof, the maker states. The wide span rigid-steel frame gives the building a broad, sweeping look.

The steel framework is designed to be strong enough to span floor areas up to 100 ft. wide, without the use of interior posts or roof trusses. Thus, the interiors are wide open, permitting unrestricted layout planning, partitioning, illumination, heating, and decoration.

The steel frames are preengineered and mass produced to fit together perfectly and speed construction time. The exterior walls can be metal or any of the traditional materials, including large expanses of glass, because the walls are nonload bearing. **Write or call: Butler Mfg. Co., 7400 East Thirteenth Street, Kansas City 26, Mo., for details on low-profile buildings.**

●

## Portable Mast Offers 300,000-Lb. Hook Capacity

Here's a new portable free-standing mast for medium-depth drilling. Named the Junior Full-View, the mast has a nominal gross column capacity of 450,000 lb. and a rated hook capacity of 300,000 lb., with eight lines strung.

Features of the mast include twin columns, with a triangular cross-section, joined above the racking platform into a one-piece top section. A convertible arrangement allows the mast to be changed from a 98-ft. double to a 132-ft. treble mast simply by adding one section and reversing the pedestals and base shoes.

The elevation of the pin-connected racking platform may be adjusted from 50 to 56 ft. on the 98-ft. mast and from 79 ft. 8 in. to 88 ft. 8 in. on the 132-ft. mast. Twin-pipe setback design of the racking platform allows room for casing to be brought in between full stands of drill pipe. Maximum racking capacity for 4½-in. drill pipe is 11,300 ft. with the 132-ft. mast and 7,560 ft. with the 98-ft. mast.

The substructure and the mast are

'RUSS MASTER' SAYS . . .

KNOCK OUT RUST WITH THIS 1-2 PUNCH!

1. **Prime** with Rustmaster, proved by laboratory comparison tests to be the best rust inhibitor!
2. **Finish** with one of General's specialized industrial coatings.

RUSTMASTER SYSTEM

Ask for details and specifications.

GENERAL PAINT CORP., Tulsa and San Francisco

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PROVEN ECONOMICAL CREW HOUSING (1 to 50 MEN or more) anywhere!

Put your personnel on-the-job and keep them there at minimum cost. Self-containment features make it possible for men to live and work independent of utilities for long periods. Nine Standard Models—or interiors to your specifications. Designed expressly for industrial work and rough terrain use—not house-trailer construction.

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*Pioneer of Mobile Housing for Field Crews*

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ELEVATED STEEL TANKS

# 1 *of* 8 *duplicate*
# pedestal spheres
## *for*
## TRUNKLINE GAS COMPANY
### Houston, Texas

Efficient, low-cost water storage blends with fine appearance in the eight PDM Pedestal Spheres serving Trunkline Gas Company at various locations. The Pedestal Sphere pictured is at Trunkline's handsome Cypress, Texas station. Each of the water storage units is of 10,000-gallon capacity, 14'6" in diameter, and 50' high to overflow. • For full information on the various types and sizes of Pittsburgh-Des Moines Steel Elevated Tanks, write for illustrated catalog.

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**Plants at PITTSBURGH, DES MOINES, SANTA CLARA, FRESNO, and CADIZ, SPAIN**

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# New Equipment

made up completely of road-width sections. To move the mast, it may be skidded erect. Or the mast may be lowered to a horizontal position, removed from the base, and carried on a truck and dolly in one piece with all lines strung. And it may be separated into sections and transported on semi-trailers. **Write or call: Ideco, one of the Dresser Industries, P. O. Box 1331, Dallas, Tex., for details on Junior Full-View mast.**

●

## Petroleum Additive Comes in Two Types

Now available to refiners is this new alkylated phenol which serves as an antioxidant for gasolines and other petroleum derivatives, including jet fuels, lubricating oils, turbine oils, transformer oils, and middle distillates such as No. 2 fuel oil.

Known technically as 2,6-di-tertiary-butyl-4 methyl-phenol and called Dav-Ad 101, the product is a white-flake, nontoxic material. **Write or call: Davison Chemical Co., Baltimore 3, Md., for details on Dav-Ad 101.**

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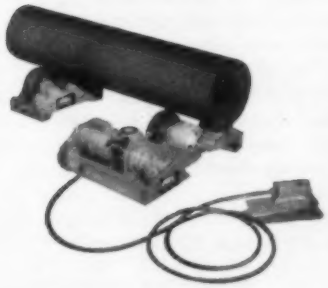

## Pipe Rotators Ease Cutting, Welding Operations

In either the field or shop, these new M-15 portable pipe rotators, consisting of one variable-speed powered rotator and one idler rotator, can be used to rotate pipe and cylindrical shapes for flame cutting and welding operations. All wheels on both the power unit and the idler unit are rubber tired.

The capacity of one power unit and one idler unit is 1,500 lb. total load.

The wheel centers on both the power and the idler unit are fixed, requiring no adjustment on pipe sizes from 2 to 24 in. **Write or call: Reed Equipment Div., Webb Corp., Webb City, Mo., for details on M-15 pipe rotators.**

*This advertisement is neither an offer to sell nor a solicitation of an offer to buy any of these securities. The offering is made only by the Prospectus.*

**Northern Ontario Natural Gas Company Limited**

**$8,000,000**

**5¾% Subordinated Debentures due 1982 (Canadian)**

**400,000 Common Shares**

(without par value)

Offered in Units each consisting of a $20 principal amount Debenture and one Common Share. The Debentures and Common Shares will not be transferable separately until January 2, 1958. Units, aggregating $3,994,000 principal amount of Debentures and 197,000 Common Shares, are being offered for sale in the United States by United States Underwriters, and the balance of the Units are being offered for sale in Canada by Canadian Underwriters.

**Price Per Unit $31.50 (United States)**

plus accrued interest on the Debentures from June 1, 1957

*Copies of the Prospectus may be obtained from any of the several underwriters, including the undersigned, only in States in which such underwriter may lawfully offer these securities and in which the Prospectus may legally be distributed.*

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June 5, 1957.

Oil execs agree: if it's fast delivery you want, you want Worthington QD (Quick Detachable) sheaves—the original two-piece design. MV.7.1

WORTHINGTON CORPORATION, Oil City, Pennsylvania

# For ACCURATE TANK GAUGING Get Wheaton *precision* in TANK GAUGES

*Wheaton T-1600 Automatic Tank Gauge*

This new Wheaton T-1600 Tank Gauge—developed and designed by Wheaton engineers—meets the most exacting requirements for accuracy. And it attains accurate gauging with a minimum of maintenance and wear.

The *large area* of the float assures the highest degree of sensitivity, and the use of 300 series stainless steel shafts and custom-fitted teflon bearings reduces friction to a minimum.

An exclusive "H" float affords easy fastening to guide wires without requiring special float guides or fasteners. The gauge can be read from the ground, obviating the need to climb the tank, and high visibility is assured by an easily-read, stainless steel tape, calibrated in feet, inches and eighths. The unit is powered by a specially engineered stainless steel neg'ator spring motor.

For maximum accuracy in tank gauging, install Wheaton T-1600 Gauges. They can be used on all types of tanks, including underground, and for all low-pressure storage.

Send for catalog No. 66, which illustrates and describes the complete line of Wheaton Tank Fittings.

**WHEATON BRASS WORKS, UNION, N. J.**

*Manufacturers of Loading Arm Assemblies, Swing Joints, Loading Valves, Tank Fittings and Truck Tank Equipment*

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**Tank Fittings by Wheaton**

**the best by every standard**

SHOWCASE . . .

# New Literature

**Engineering and Construction Services.** New Bulletin 2547 describes the complete engineering and construction services Blaw-Knox Co. provides for the petroleum industry. The 28-page bulletin lists a broad line of refining processes which the company offers. It also illustrates numerous types of units designed and engineered for firms in the petroleum and petrochemical industries. **Write or call: Blaw-Knox Co., Chemical Plants Div., Box 1198, Pittsburgh 30, Pa., for Bulletin 2547.**

•

**Selector Manual for Corrosion-Resistance Pumps.** To help users select the correct corrosion-resistant pump for any application up to 350 g.p.m., new 20-page Pump Manual CE-55 presents comparative data for four types of pumps. It includes molded hard-rubber centrifugal pumps, rubber-lined centrifugal pumps, numerous impeller pumps, and gear pumps. The manual lists about 20 common chemicals and lists pumps suitable for handling the chemicals at room, warm, or hot temperatures. Capacity charts and complete specifications assist the user in selecting a pump. **Write or call: American Hard Rubber Co., 93 Worth Street, New York 13, for Manual CE-55.**

•

**Reports on Galvanic Protection.** These two reference manuals describe the use and application of zinc as a galvanic anode to protect iron and steel from corrosion. The new A.Z.I. publications deal with zinc as a galvanic anode, both underground and underwater. The 16-page manual, "Zinc as a Galvanic Anode Underwater," describes the way zinc anodes protect marine craft, water-storage tanks, H piling in sea water, traveling water screens, and spillway and lock gates against corrosion.

The 40-page manual, "Zinc as a Galvanic Anode Underground," discusses the theory and practice of zinc-anode application in transmission pipelines, gas-distribution systems, transmission-line towers, ground rods, grounding cells, and domestic oil tanks. **Write or call: American Zinc Institute, Inc., 60 East Forty-Second Street, New York 17, for booklets on galvanic protection with zinc.**

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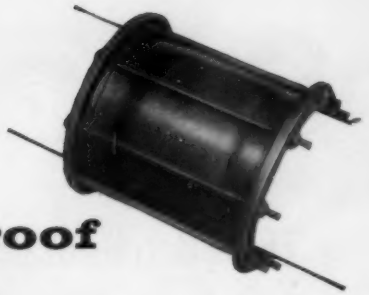
**Teflon Laminated Pipe Bulletin FTL-2** (four pages) describes the design, construction and typical application of a chemically inert pipe processed from

for vibration-proof connections

join pipe

THE DRESSER WAY!

Dresser Couplings or Long Sleeves provide the necessary "give and take" to absorb vibration, settlement and other stresses. They're the handiest, surest, safest way of making perfect joints wherever you're joining pipe.

Specially compounded rubber gaskets permit up to 4° deflection at joints—yet with Dresser Couplings these joints stay permanently tight.

Any workman can install Dresser Couplings, averaging only two man-minutes per bolt. The only tool needed is a wrench. Pipe threading is not necessary.

AVAILABLE AT ALL LEADING OILFIELD SUPPLY STORES IN THE UNITED STATES AND CANADA

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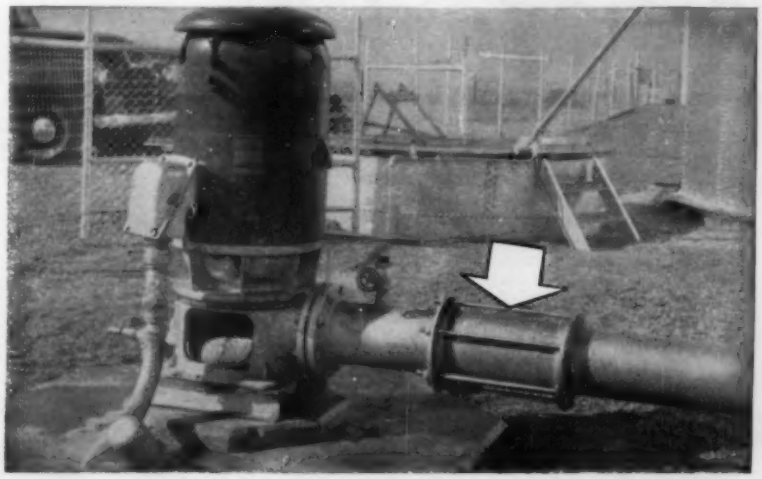
Dresser 8" Style 40 Long Sleeve on water well hookup in cycling plant



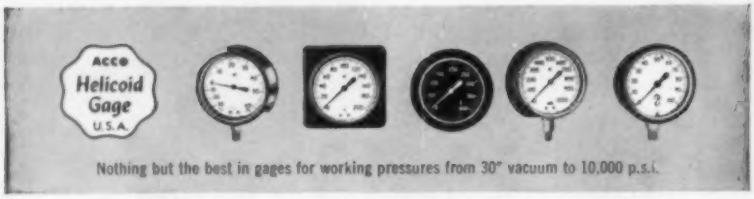
Style 38 Coupling

Style 40 Long Sleeve

Hydrepair® Asbestos Cement Pipe Clamp

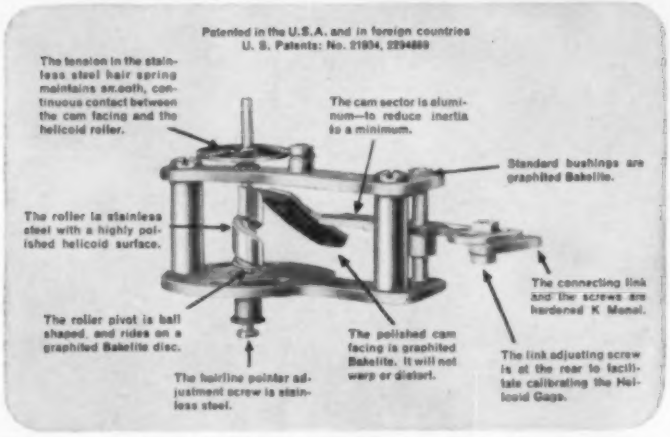
Style 63 Expansion Joint

Style 39 Insulating Coupling




Nothing but the best in gages for working pressures from 30" vacuum to 10,000 p.s.i.

# These details of Helicoid gage design assure longer life and enduring accuracy


Patented in the U.S.A. and in foreign countries
U. S. Patents: No. 21934, 2294889
The tension in the stainless steel hair spring maintains an even, continuous contact between the cam facing and the helicoid roller.
The cam sector is aluminum—to reduce inertia to a minimum.
Standard bushings are graphited Bakelite.
The roller is stainless steel with a highly polished helicoid surface.
The connecting link and the screws are hardened K Monel.
The roller pivot is ball shaped, and rides on a graphited Bakelite disc.
The polished cam facing is graphited Bakelite. It will not warp or distort.
The link adjusting screw is at the rear to facilitate calibrating the Helicoid Gage.
The hairline pointer adjustment screw is stainless steel.

The superiority of Helicoid Gages is most evident in severe service—wherever a gage is subjected to violent pressure pulsations or severe mechanical vibrations.

The *sustained accuracy* of Helicoid Gages over *millions of cycles* is explained by the details of design and construction of the Helicoid movement shown above. Such Helicoid features—protect against wear and corrosion and assure sensitivity, sustained accuracy and trouble-free operation.

**Easiest adjustment and calibration**

Only Helicoid Gages have the external pointer adjustment pictured here. The Helicoid type adjustment cannot be jarred out of position.

Calibration of Helicoid Gages is accomplished easily, without removing dial or pointer, because the link adjusting screw is at the rear of the system.

**Tubes built for millions of pressure pulsations**

To fit the wide range of applications, Helicoid Bourdon tubes are available in four materials—alloy steel, K Monel, stainless steel and phosphor bronze.

All Helicoid tubes are made from seamless tubing and are carefully designed to give maximum torque and minimum stress. When used within the dial range, they will withstand many millions of pressure pulsations and will not stretch, leak or crack.

*For complete information on the Helicoid line of gages write for* **Catalog G-52**

Helicoid gives you all these features at prices that are competitive in the quality gage field.

**Helicoid Gage Division**
**AMERICAN CHAIN & CABLE**

929-A Connecticut Avenue • Bridgeport 2, Connecicut

ACCO
A·C·G
TRADE MARK


Teflon resin and glass fiber. The bulletin lists piping specifications for the pipe and includes detailed drawings and specifications showing how it can be incorporated into existing piping systems. It also furnishes specifications on elbows and couplings for use with the pipe. The elbows, lined with a layer of a special compound of Teflon, are available with 125 and 150-lb. A.S.A. integral flanges and housings.

The bulletin also gives the specifications for molded bellows designed for use in all types of piping systems as flexible joints, expansion joints, or vibration dampeners. **Write or call: Resistoflex Corp., Roseland, N. J., for bulletin on Teflon laminated pipe.**

•

**How to Identify Your Piping Systems** by colors and lettering is clearly outlined in this new manual. The manual contains specifications laid down and approved by the American Standards Association in conjunction with the National Safety Council and the American Society of Mechanical Engineers. It tells the color to use for each class of fluids and gases. It also reproduces the colors in actual tones, giving sizes and frequency of legends and complete explanations of the dual methods recommended—by color and by legend.

To further simplify the job, the manual shows the numbers of the coatings to be used, with instructions for application for each different category of fluids or gas. **Write or call: Rust-Oleum Corp., 2799 Oakton Street, Evanston, Ill., for Form 117.**

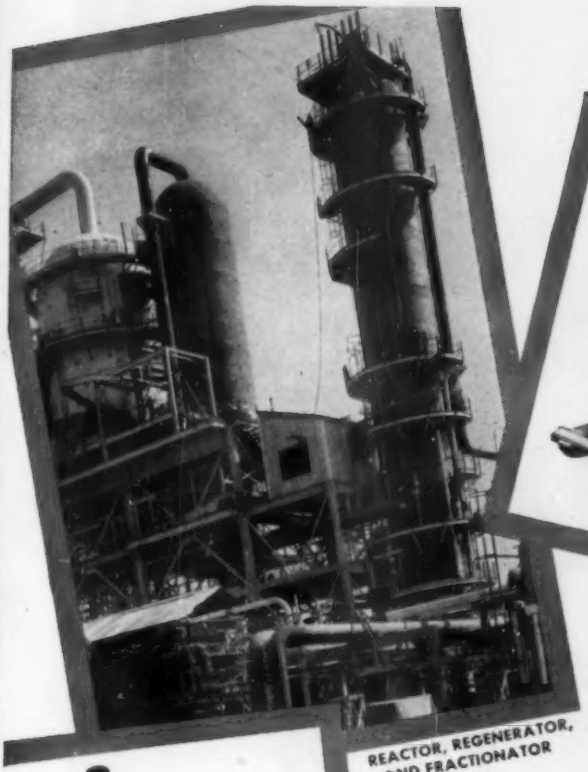
•

**Plastic Valves and Pipe Fittings.** This 16-page illustrated bulletin describes Walworth's polyvinyl-chloride valves and fittings. The bulletin presents four pages of application tables on the performance of normal-impact and high-impact PVC valves and fittings for handling about 315 different fluids.

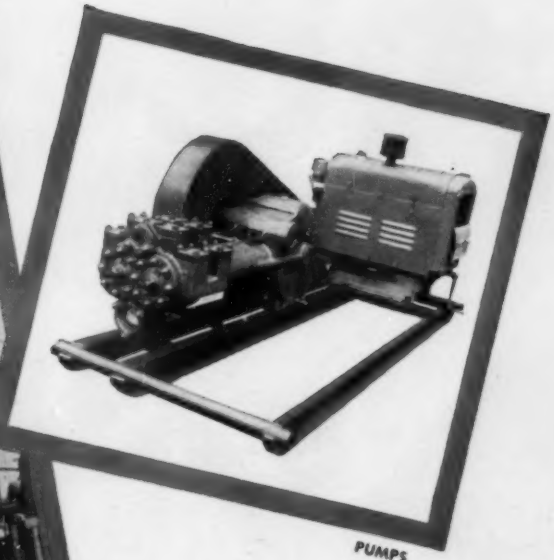
Four tables give data on physical properties, recommended working pressures, and effect of temperature on working pressure. Line drawings show PVC fittings for threaded and welded pipe along with dimension and weight information for each. The bulletin concludes with installation and assembly guides for PVC piping systems. **Write or call: Walworth Co., 60 East Forty-Second Street, New York, for bulletin on corrosion-resistant plastic valves and fittings.**

•

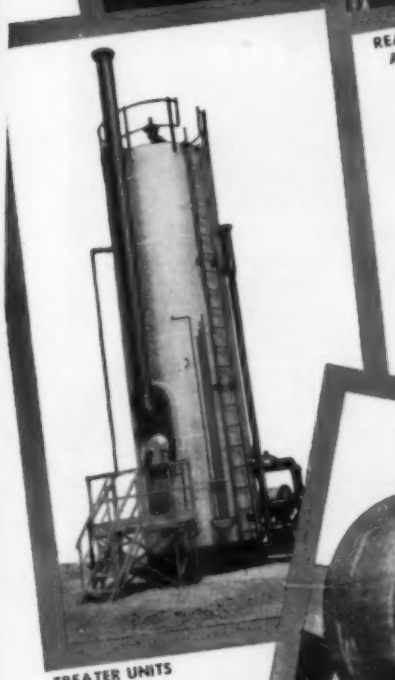
**V-Drive Catalog Form F-10** (46 pages) covers V-drives, drive parts, and accessories in the range of fractional to 10 hp. The catalog presents descriptions and size data on Maurey bushed



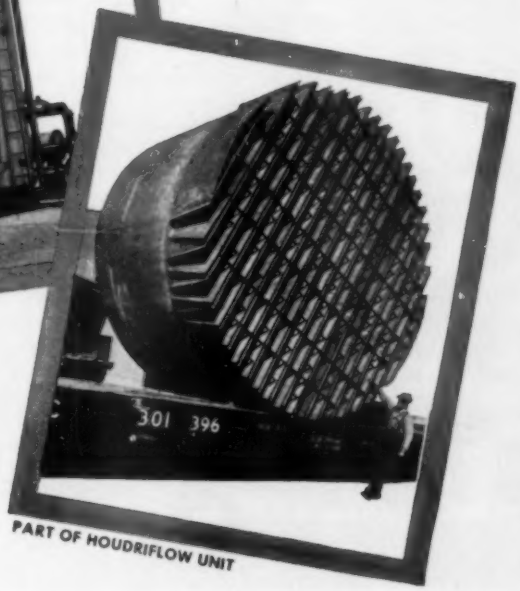
REACTOR, REGENERATOR, AND FRACTIONATOR



PUMPS



TREATER UNITS

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# *Serving Canada's Oil and Petro-Chemical Industries*

**To meet the growing needs of Canada's Oil and Petro-Chemical Industries, Dominion Bridge are further expanding their various plants and facilities . . . particularly in oil producing areas.**

**For all types of platework and fabricated steel used in refinery or field operations, remember the name DOMINION BRIDGE — it is your assurance of long experience, the most modern techniques and a reputation for unsurpassed workmanship.**

**Some examples of our work are shown on this page. For complete information, write for illustrated booklet "Platework for every industry", Publication No. PNN-100.**

**DOMINION BRIDGE COMPANY, LIMITED**

PLANTS: MONTREAL • OTTAWA • TORONTO • WINNIPEG • CALGARY • VANCOUVER • Associate Company Plants: **AMHERST, N.S.** – Robb Engineering Wks., Ltd. • **QUEBEC** – Eastern Canada Steel & Iron Wks., Ltd. • **SAULT STE. MARIE** – Sault Structural Steel Co. Ltd. • **WINNIPEG** – Manitoba Bridge & Eng. Wks., Ltd. • **CALGARY** – Riverside Iron & Eng. Wks., Ltd. • **EDMONTON** – Standard Iron & Eng. Wks., Ltd.

*Dominion Bridge*

# At her finger tips smooth power from a UOP process . . .

It takes only the touch of a finger to send today's high horsepower, high compression automotive engines into action. But to keep them running with full power and efficiency requires super-motor fuels made possible because of new refining methods which yesterday were just a bright idea in some research man's mind.

For more than four decades UOP has been developing better petroleum refining processes to keep motor fuels ahead of the progressively higher requirements demanded by improved automotive engines.

Whatever the volume of his operation, any refiner, anywhere in the free world, has available a UOP process to help him produce the motor fuels that will insure his customers getting full smoothness, power and speed from their new cars' modern engines.

When an ignition key is switched on most anywhere today, chances are that the fuel which sends a surge of power through the engine has been produced by one or more UOP processes.

UOP®

**UNIVERSAL OIL PRODUCTS COMPANY**

**30 Algonquin Road, Des Plaines, Illinois, U.S.A.**

*More Than Forty Years Of Leadership In Petroleum Refining Technology*

and fixed-bore type of cast-iron and pressed-steel V-pulleys, V-belts, refrigeration fans and fan pulleys, and V-drive accessories. The nine-page engineering data section contains useful charts for the selection of proper pulley size and belt length, and it also gives suggestions for installing belts. **Write or call: Catalog Div., Maurey Mfg. Corp., 2915 South Wabash Avenue, Chicago 16, for Form F-10.**

●

**Automatic Package Controls** which will react to changes in current or voltage as small as 0.2 microamperes or 0.1 mv. and suitable for virtually any industrial application where a chemical or mechanical function can be measured electrically are described in this new 16-page catalog. It discusses such specific applications for the units as control of temperature, torque, viscosity, current, voltage, timing of welding, speed, battery charging, radiation, moisture content, pressure, deflection, thickness, weight, color, and light. Diagrams explain the control's structural features and tables giving their ranges and prices. **Write or call: Tipp-Tronic, Inc., Tipp City, Ohio, for automatic-controls catalog.**

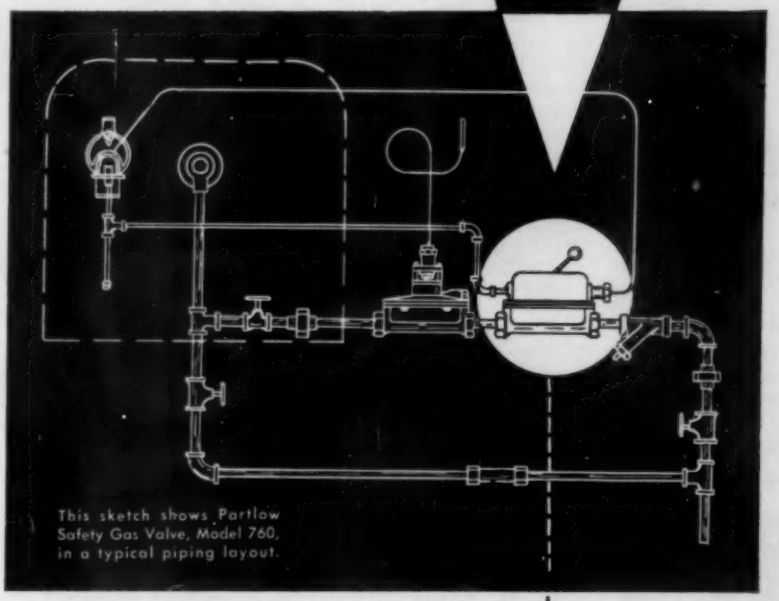
●

**Hydraulic Power Units** are described and pictured in this new 52-page catalog. It contains complete technical data and specifications on 2,240 different types and models of pumps, single and duplex pressure switches, hydraulic cylinders, and accessories, including tube connectors, valves, hydraulic hose and fittings, tubing, and gages. The catalog also includes specification data charts which can be filled out by prospective users of Oil-Dyne equipment to secure quotations and recommendations for the proper unit for application. **Write or call: Oil-Dyne, Inc., 2119L West Marquette Road, Chicago 36, for catalog on hydraulic power units.**

●

**Purifiers, Mist Extractors, Scrubbers, Steam Traps and Strainers** are the subject of new eight-page Bulletin 801. Including new information on improved types of internal purifiers for installation inside evaporators, boilers, and other process vessels, the bulletin gives buying information on line type of purifiers and receiver type of scrubbers for handling extremely large slugs of liquid. A selection chart shows recommended sizes of line type of purifiers at various steam flows on different pressures. **Write or call: V. D. Anderson Co., 1935 West Ninety-Sixth Street, Cleveland 2, Ohio, for Bulletin 801.**


Here's **positive protection** against gas pilot failure



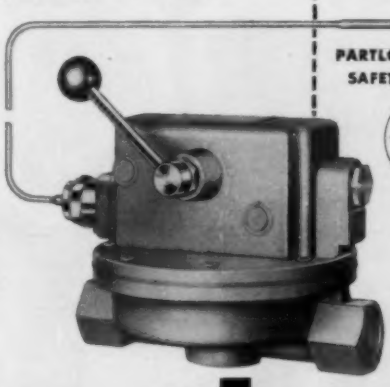
This sketch shows Partlow Safety Gas Valve, Model 760, in a typical piping layout.

The Partlow Safety Gas Valve is ideally suited to oil field applications. *It's thermally operated . . . requires no electrical connections.*

This combustion safeguard gives positive protection to gas-fired appliances . . . prevents damage from gas pilot failure.

Rugged valve opens only after mercury actuated element becomes red hot from contact with pilot flame. If pilot goes out, element cools and releases a latch, causing valve to snap shut.

*No conventional slip stem to corrode and stick.* Strong perforated diaphragm guides valve disc to its seat.



**PARTLOW MODEL 760 SAFETY GAS VALVE**

***WRITE TODAY FOR BULLETIN NO. 741***

**THE PARTLOW CORP., Dept. 3-157. NEW HARTFORD, N.Y.**

**partlow**

**the pioneer in mercury thermal controls**

Offices in All Principal Cities

# EQUIPMENT MEN . . . in the News

## Cardwell Names Poore as Tristate District Manager

GENE POORE

Gene Poore has been appointed district manager for Cardwell Manufacturing Co. in the tristate area of Indiana, Illinois and Kentucky, according to Clyde Lackey, domestic sales manager. Poore will headquarter at Cardwell's parts and supply store in Mount Vernon, Ill.

Poore was formerly with American Manufacturing Co. of Texas as a sales representative. He has also had wide experience in the oil-field-supply business.

## Republic Store Managers Complete Training Conference

**The fourth group of Republic Supply Co. store managers has just completed a training conference at the general offices in Oklahoma City. This course, which was designed to improve the services of Republic to its customers, was conducted over a 2-week period by George Steinmeyer, a former store manager.**

**Attending the conference were: (back row) A. L. Paylor, Seminole, Okla.; E. C. Burge, Victoria, Tex.; S. H. Bishop, Nocona, Tex.; George Steinmeyer, instructor. Front row: A. D. May, Ellinwood, Kans.; R. R. Woodall, Alice, Tex.; T. C. Mahler, Olney, Tex.; B. G. Barton, Whitesboro, Tex.; H. R. Leimer, Borger, Tex.**

## Howco's Kilgore Named to National Petroleum Council

G. KILGORE

Grover Kilgore, Halliburton Oil Well Cementing Co., Duncan, Okla., vice president for sales and advertising, widely known for his efforts on the part of the petroleum industry, was appointed to the important National Petroleum Council, which advises the Government on matters pertaining to oil production, refining and distribution.

Secretary of the Interior Seaton stated that Kilgore would represent the Petroleum Equipment Suppliers Association, of which Kilgore is national president.

## American Iron Announces Executive Promotions

C. L. GRIFFIN

W. R. WHEELER

V. S. HARLIN

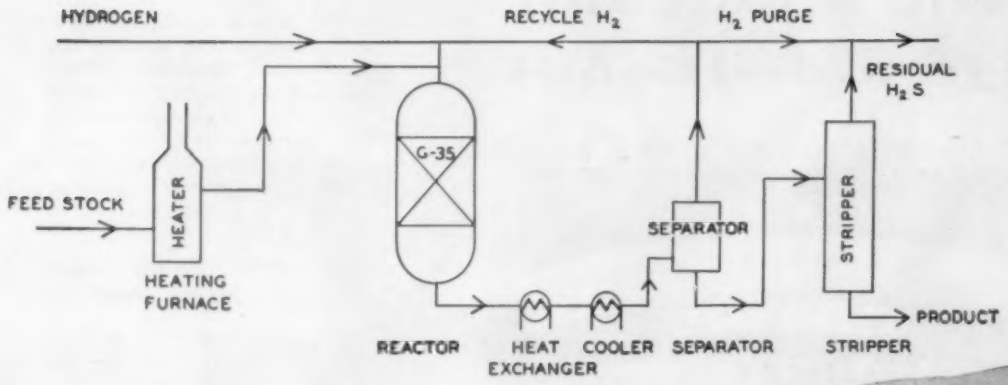
Claude L. Griffin has been named vice president and assistant to the president by American Iron & Machine Works Co., Oklahoma City. W. R. Wheeler, Jr., has been named sales manager for American Iron and Varney S. Harlin has become vice president in charge of engineering and manufacturing.

In 1947 Griffin started with American Iron's engineering department on special tool joint design projects. In 1949 he was appointed sales manager and has held this position until his recent promotion. Harlin joined American Iron in 1934 as a machinist. In 1940 he became chief engineer and in

## Foreign Guests Attend Meeting of Houston Nomads

**Guests attending a recent meeting of the Houston Chapter of Nomads were: (left to right) E. J. Richards, Bolivian Gulf Oil Co.; G. Browne, Sarawak Oilfields; R. Barber, Cameron Iron Works, Barcelona, Va.; G. A. Standish, Colombian Petroleum Co.; W. J. Safford, Mannesmann Tube Co., Ontario, Canada; A. J. Tucker, Seas, Inc.**

**Seated: K. R. Gibbs, Asiatic Petroleum Co.; A. E. Albiston, Brown Drilling Co.; and Carl R. Bergman, Tidewater Oil Co.**




Naphthas, middle distillates, gas oils and lube stocks can all be upgraded by hydrogen treating with the use of new Girdler G-35 catalysts. These highly active cobalt molybdenum catalysts were developed specifically for the desulfurization, denitrification and stabilization of petroleum feedstocks covering a wide molecular weight range. Typical flow diagram is shown.

# *Check these outstanding benefits of G-35 hydrogen-treating catalysts*

**G-35 HAS OUTSTANDING PHYSICAL PROPERTIES** — these are retained even after extended use. Permit outstanding operational flexibility, continuous economical operation with essentially 100% yields.

**IMPROVEMENT OF COLOR** stability, lead susceptibility, burning characteristics and the removal of poisons from catalytic reforming feedstocks are among the more important results achieved. Girdler's expanded production facilities are geared to meet your needs for G-35 catalysts.

**DETAILED INFORMATION** is available on G-35 catalysts. Bulletin GC 304 discusses applications, gives process conditions for various distillate stocks, performance features and typical catalyst specifications. Free on request.

CATALYST DEPARTMENT

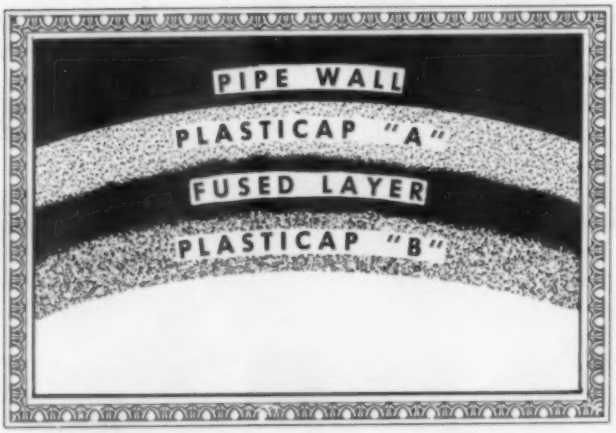
**The GIRDLER Company**

A DIVISION OF NATIONAL CYLINDER GAS COMPANY

LOUISVILLE 1, KENTUCKY

GIRDLER MANUFACTURES CATALYSTS FOR: HYDROGENATION • SYNTHESIS GASES AND HYDROGEN GENERATION • DESULFURIZATION • NEW CATALYTIC PROCESSES

# Plastic Applicators pays a dividend!




Years of research and development work went into Plasticap "AB"— the new combination baked-on protective film that pays users of coated tubing a dividend in extra security against acid corrosion, alkali attack and mechanical failure. Millions of feet of coated tubing have demonstrated the advantages of Plasticap "A" and Plasticap "B". Now you can benefit from the BEST OF BOTH in specially formulated Plasticap "AB".

***WRITE FOR DESCRIPTIVE LITERATURE***

Plastic Applicators, Inc.

TUBULAR GOODS INSPECTION SERVICES
BAKED-ON PLASTIC COATINGS

**HOME OFFICE AND PLANT:**
P. O. Box 7631, Houston, Texas. Phone: UN 9-2491.
**BRANCH OFFICES AND PLANTS:** P. O. Box 388, Harvey, La. Phone: Fillmore 1-1636—P. O. Box 2749, Odessa, Texas. Phone Emerson 6-4491.
**SALES OFFICES—TEXAS:** Houston, Corpus Christi, Dallas, Midland, Odessa. LOUISIANA: Lafayette, New Orleans, Harvey.

7165


1954 was made manager of engineering and manufacturing, holding this title until his recent promotion. Wheeler began with the company in 1935. He has been in the sales department in various positions since that time. Prior to becoming assistant sales manager in 1953, he was special representative in Tulsa.

## McClintock Named Sales Manager by Kerotest

McCLINTOCK

Jack M. McClintock has been appointed sales manager, steel valve division of Kerotest Manufacturing Co., Pittsburgh, Pa., according to W. G. Young, president.

McClintock was formerly special products representative for Miller Printing Machinery Co., Pittsburgh.

## J&L Supply Transfers Higgins to Worland, Wyo.

Carl G. Higgins, local store manager, has been transferred from Newcastle to Worland, Wyo., according to A. G. Bastian, manager-field sales division of Jones & Laughlin Supply Division.

Higgins joined J&L as a storeman at Pauls Valley, Okla. He served as storeman at Casper, Wyo., and was promoted to local store manager at Newcastle in 1956.

## Craton Outlines Marketing Of GE Drilling Equipment

Foreman H. Craton, marketing manager for General Electric Co.'s locomotive and car equipment department, has said his company is ready to launch an all-out sales campaign to take advantage of an extensive potential market for electric oil-well drilling equipment. He said current high sales for large offshore drilling rigs has tended to obscure the far larger potential market for land rig application in both domestic and foreign service. He outlined basic marketing policy at the start of a 2-day conference of foreign and domestic General Electric sales representatives held in Galveston, Tex.

Up to now nearly all of the electric drive equipment has been applied for use on barges and platforms while, as Craton pointed out, a relatively small percentage of the total drilling in this country is done over water.

Until recently electric drives have been more expensive than the mechanical or torque-converter drives. The

# SAVE 2 WAYS WITH

# MARTIN RUBBER GUIDE CAGES

**1. GREATER PRODUCING PROFITS** *because:*

Martin Cages last much longer. The oil-proof rubber guides do the trick, by absorbing the ball peen hammer action of the hard balls. They also have superior resistance to sand abrasion. And they can be replaced.

**2. GREATER PRODUCING PROFITS** *because:*

Ball & Seat life is usually doubled, on the average. With the rubber guides, there is much less chattering, chipping and pitting. Ball falls true on seat. Such improvement in Ball & Seat life eliminates a lot of pulling expense.

In the last year alone, new users of Martin Cages have increased by 85%. The word is getting around. More and more economy-minded producers are learning about the advantages of the Martin Cages! . . . Manufactured in open and closed types . . . all diameters and styles. Write for John Martin Catalog No. 4 today. *Martin Cages are available through all supply stores.*

**JOHN N. MARTIN**

*Manufacturer*

9 W. BRADY • TULSA, OKLA.

# Users Say R/M BELTS AND HOSE

## Smooth Running CONDOR V-BELTS Cut Operating Costs!

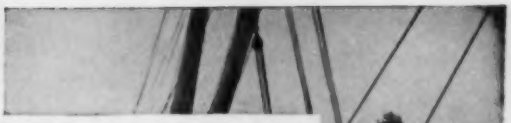
R/M engineering micro-positions V-belt strength members in heat-dissipating rubber . . . for a smoother running, cooler running drive . . . longer belt life under heaviest loads! Flat sidewalls put positive pressure on sheave grooves for more *grip* . . . *less* slip. Super-strength synthetic cords *all* pull equally to deliver uniform, maximum share of power. Pre-stretching during manufacture removes inelastic stretch that might occur on the job.

***Write for Bulletin #6868***

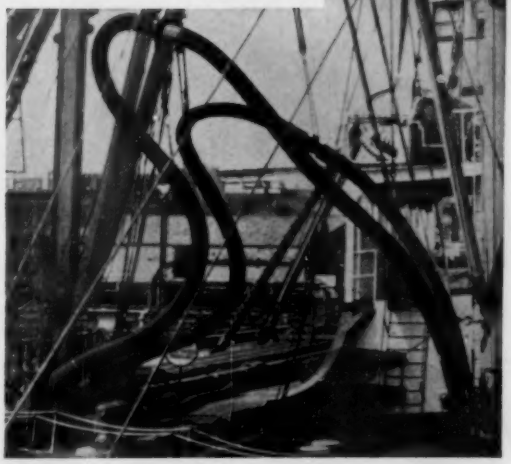
## NEW MOISTURE-PROOF VACUUM PACKAGING

Oil-Field Condor V-Belts are now *length certified* from factory to field! Belts are measured under controlled humidity . . . identified for precise matching . . . vacuum-sealed in moisture-proof aluminum lined bags. Result? No shrinkage or elongation in storage . . . sustained uniformity in the drive!

***Write for Bulletin #7072***



# Give You "*More Use per Dollar*"



## PARANITE LOADING HOSE

Full-flow, uniform bore reduces dock time. Type "C" built-in, leak-proof fittings. Safe flexibility is combined with crush-resistance. Made of oil-proof synthetic rubber, in smooth and rough bore types for ship, sea-loading, and barge. Pressures from 125 lbs. to 200 lbs. Ask your R/M representative also about Manhattan Mud Pump Intake Hose, Geophysical Hose, Ray-Man Vibration Hose, Super Master Burst-Resisting Steam Hose.

## RAY-MAN ROTARY HOSE

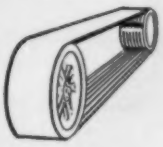
### Lasts Longer on Your Rig

Manhattan's method of applying high-tensile steel cable wires under precisioned tension provides unequalled strength *plus* flexibility . . . unusual resistance to kinking or accidental crushing. Ray-Man CBL Rotary Hose holds steady without whipping . . . even under pressures of deep drilling. Ray-Man's streamlined, built-in coupling with leak-proof "Lip-Lok" seal actually tightens under pressure . . . prevents blow-outs. Result? Lower costs because you get longer, trouble-free service!

***Write for Bulletin #6743***

## *R/M Poly-V® Drive*

**Bulletin #6638 shows how flat belt simplicity *plus* V-groove grip gives up to 50% more power delivery with R/M's patented Poly-V* Drive!**



****Poly-V Drive is a registered Raybestos-Manhattan trade-mark.***

RM-722

**BELTS • HOSE • ROLL COVERINGS • TANK LININGS • INDUSTRIAL RUBBER SPECIALTIES**

**MANHATTAN RUBBER DIVISION—PASSAIC, NEW JERSEY**

# RAYBESTOS-MANHATTAN, INC.

Other R/M products: Abrasives and Diamond Wheels • Brake Blocks and Linings • Clutch Facings • Asbestos Textiles • Mechanical Packings • Engineered Plastics • Sintered Metal Products • Industrial Adhesives • Laundry Pads and Covers • Bowling Balls

Campbell Chain

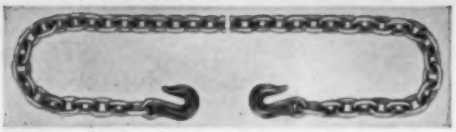
GOES BIG WITH ANY RIG!

"Measure-Mark" Chain

CAM-ALLOY and CAMPBELL HIGH TEST STEEL

*Exactly* marked every 5'. Color-coded for instant grade identification. Standard footage in every pack—color-coded labels with inventory control. **Cam-Alloy** features *extremely* high tensile strength—excellent resistance to wear—light weight for given load. Look for the *orange* "Measure-Mark." Campbell **High Test** Steel Chain is high-carbon steel, heat-treated for high tensile strength and maximum resistance to abrasion. Short links give maximum flexibility. Look for the *blue* "Measure-Mark."

**BOOMER CHAINS**



Made from Cam-Alloy or High Test Steel Chain with Grab Hook each end, 20 feet long. Supplied bright finish. Packed one chain in cloth bag. In dimensions and weights for every job.

**WINCH LINE CHAINS**

Made from High Test Steel Chain, heat-treated for increased resistance to wear and shock loads. Tagged for size and length. Bright finish. In dimensions and weights for every job.

**TRUCK TIRE CHAINS**

Available in 3 grades: *Lug-Reinforced* for maximum traction and wear, *Mud-Service* for off-the-road use, *Highway Service* for general use . . . single pneumatic and dual triple.

**CAMPBELL CHAIN** CAMPBELL CHAIN *Company*

*Factories and Offices:* York, Pa.—W. Burlington, Iowa

**WAREHOUSES:** Campbell Chain Company, 712 "R" St., P.O. Box #1144, Sacramento, Calif.; Wald Terminal Warehouse, 902 Live Oak, Houston, Texas.

**WEST COAST SALES MANAGER:** D. R. Coutts, 1933 Mission Ridge Road, Box 1175, Santa Barbara, Cal.

**TERRITORY MANAGERS:** J. N. Kuhl, 7000 S. Shore Drive Hotel, Chicago, Ill.; S. Hardison, 1970 Val Verde, Germantown, Tennessee; S. Adsit, 17 E. 57th St., Kansas City, Mo.; A. E. Vincent, 3917 Thaxton Ave., S.E., Albuquerque, N. Mex.; K. Steinmetz, 1339 Sherwood Road, Glenview, Ill.; D. A. Ruffin, 5623 Boaz St.—Apt. #90, Dallas 9, Texas.

**CONTACT ANY OF THE CAMPBELL REPRESENTATIVES ABOVE FOR COMPLETE INFORMATION ON *ANY* TYPE OF CHAIN—OR HELP WITH A PARTICULAR CHAIN PROBLEM.**


electric drilling drive became competitive in price when relatively low-cost specialized mass-produced locomotive propulsion motors, generators, and controls were adapted for this use. GE manufactures a complete line of this equipment in its Erie, Pa., locomotive factory.

## Texas Groups Hear Bank of Southwest's Harold Vance

Harold Vance, vice president and manager, oil and gas department, Bank of the Southwest, was guest speaker for two recent meetings. He appeared before the Geological Society of Corpus Christi as principal speaker and spoke to the Petroleum Engineering Club of Texas A. & M. College on the subject, "General Philosophy from the Engineer's Viewpoint."

## Failing Names Supervisor For Distributorship Sales

W. V. GOSHORN

W. V. (Bill) Goshorn has become distributorship sales supervisor for George E. Failing Co., Enid, Okla., manufacturers of portable rotary rigs, according to E. A. Johndrow, vice president of sales for the Failing company. Goshorn was with Lucey Products Corp. for 16 years as Oklahoma district manager.

## Waukesha Names Hartzog As Houston Sales Engineer

Ray Hartzog has been named sales engineer in the Houston area for Waukesha Sales & Service, Inc. Hartzog worked for Texas Co. and Union Oil Co. of California in the Southwest for several years. Recently he was office manager for McGregor Carbon Forms Co.

## Dowell Engineers Attend Refinery Operation School

Dowell Incorporated engineers and salesmen from the company's industrial division offices recently attended an intensive course in refinery operation and maintenance, according to R. H. Smith, Dowell director of sales. Heading the teaching staff was I. R. Bielek, development engineer.

Bielek recently completed a 16-week course in refinery operation. Others taking part in the program were: G. E. Mullin, district engineer, Philadelphia;

H. K. Nelson, sales engineer, Baltimore; P. R. Cotter, district area manager, Cleveland; O. W. Bosworth, sales engineer, Houston; L. C. Baskin, industrial engineer, Chicago; C. L. Brain, industrial engineer, Borger; A. C. Shoults, chemist, Tulsa; B. L. Canaday, development engineer, Tulsa; L. E. West, general sales engineer, Tulsa; and J. C. McCormick, personnel training manager, Tulsa.

## Field Representatives Appointed by Oilwell

The appointment of Henry M. Fuglerud as field representative at Edmonton, Alta., Canada, and transfer of William M. Wallace, field representative, from Drayton Valley to Red Deer, Alta., have been announced by W. A. Weir, Canadian area manager of United States Steel Corp.'s Oil Well Supply Division. Arthur L. Crenshaw and Oscar W. Mykleby have been appointed field representatives at Harvey, La., according to M. F. Jones, Gulf Coast area manager of the division.

Fuglerud and Wallace joined the division in 1953. Wallace later transferred from Okotoks to Wetaskiwin, in 1955 was appointed field representative at Red Deer, and transferred to Drayton Valley in 1926. Mykleby and Crenshaw joined the division in 1956 at the Harvey store.

## Parsons Appoints Thomas Manager, Industrial Dept.

H. W. Thomas has been appointed manager of the industrial department, project development division, at the Los Angeles headquarters of The Ralph M. Parsons Co. Thomas' background in the aircraft industry includes experience as chief experimental test pilot and sales and engineering with Curtiss-Wright Corp. and Lockheed Aircraft Corp.

## Cooper-Bessemer Appoints Hunter Branch Manager

F. J. HUNTER

The promotion of Frank J. Hunter to branch manager is announced by Robert F. Lay, vice president and general sales manager of The Cooper-Bessemer Corp. Hunter's appointment fills the position left by W. S. (Bill) Arthur who has retired from the company.

As branch manager, Hunter will be responsible for all sales and service activities of the company in the St. Louis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**New Bulletin** describing the important role of protective coatings in preventing corrosion is available. Request your copy by coupon below.

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# how to
# CUT CORROSION LOSSES
## a report by Koppers Company, Inc.

*Number 10 of a series*

Dr. W. F. Fair, Jr.
Corrosion Consultant

Since the security of a multi-million dollar investment is at stake, preventing corrosion in buried steel pipelines is extremely important. In this field the decisions made as to corrosion-prevention practice in the *design* phase are irrevocable—and can prove tremendously expensive if wrong.

* * *

Hot applied coal tar enamels have been traditionally the primary part of the protection system on pipelines. In recent years, cathodic protection has become widely accepted as a supplement to coatings. Enamels must now be judged as much on their value as long-term insulating materials as on their ability to prevent corrosion.

* * *

The best clue to a coating's performance is its ability to resist penetration by water. It is this inherent characteristic that determines a coating material's performance underground, with or without supplementary cathodic protection. As a coating absorbs water, it provides a decreased resistance to the flow of electric current between pipe and soil which is part of the corrosion process. Ultimately, water absorption leads to coating deterioration, which exposes bare pipe. In conjunction with cathodic protection, the coating system's most important function is that of a long-lasting electrical insulator so that impressed current requirements are kept to a minimum. Here too, a coating system's resistance to water penetration determines its performance. Actual pipeline operating experience has shown that the cost differential between maintaining cathodic protection on well and poorly insulated lines can amount to hundreds of thousands of dollars yearly.

* * *

Independent laboratories and industrial researchers have expended considerable time and effort in determining water absorption rates of protective coatings. Long-term tests have demonstrated, without exception, that coal-tar enamels have the highest resistance to water absorption among protective coating materials commercially available today.

The key to a coating's ability to resist water absorption seems to depend on the inherent molecular structure of the base material. The relative performance of a number of coatings in these various tests indicates that coating impermeability depends upon *aromatic content.* Coal tar enamel binders with an aromatic content in excess of 90%, show excellent water resistance in all tests while less aromatic materials show comparably poorer performance. Materials high in paraffinic content have been shown to leach under extended immersion.

* * *

An audio-visual meeting presentation discussing this important subject in detail is available. If you are interested in having a group-showing of this material—which includes a sound film—please address your inquiries to "How Long Should A Pipeline Last?," Koppers Bldg., Pittsburgh 19, Pa. or to Koppers District Offices: Boston, Chicago, Los Angeles, New York, Pittsburgh and Woodward, Ala. In Canada: Koppers Products, Ltd., Toronto, Ontario, and Edmonton, Alberta.

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**COATINGS AND ENAMELS**

and Kansas City areas. This will include personal contact with workers and operators of engine and compressor equipment in the Kansas City district. In addition he will direct sales and service of diesel, gas and gas-diesel engines for marine propulsion and electric power generation.

Hunter joined Cooper-Bessemer in 1955 and until recently was the Cooper-Bessemer sales representative in Kansas City, Mo.

## Joe Stine Opens New Shop to Give Offshore Service

**Aerial view of Joe Stine's Harvey Machine & Fabricating Co., Inc., plant.**

Joe Stine, Inc., of Houston, has completed a fully equipped new machine shop which is in service in Harvey, La. The latest expansion represents a major addition to the facilities on the Harvey Canal for servicing offshore operations, according to Joe Stine, president of the manufacturing firm.

The business is to be operated under the name of Harvey Machine & Fabricating Co., Inc., and will be under the general management of Tom Crain, longtime operator of such facilities.

The plant is situated on a 15-acre site on Peters Road, near Harvey, with an 800-ft. frontage on the Harvey Canal and a 500 by 500-ft. slip off the canal to accommodate almost any type of offshore vessel work. The building itself has 25,000 sq. ft. and is 230 ft. long, with a crane runway of some 250 ft.

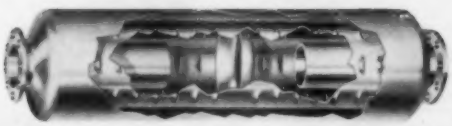
This complete new plant and operation were designed specifically to meet a demand for on-the-spot service for

**JOE STINE**

**TOM CRAIN**

customers of the Houston plant of Joe Stine, Inc., as well as others engaged in offshore operations. Joe Stine, Inc., has contributed a number of innovations in hydraulic devices, big barge spud jacks, rig skidding jacks, and other offshore custom-made products for some of the major operators in the offshore industry.

Complete facilities for all types of machine work and custom fabrication have been installed, and supervision is under skilled craftsmen. Complete repair facilities will be available, as well as the engineering and design of special equipment such as lift mechanisms, barge stabilizers, and special heavy plate work.

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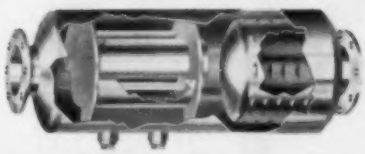

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***Bartlesville, Oklahoma***

# Texas Ponders Its Offshore Future

By Frank J. Gardner

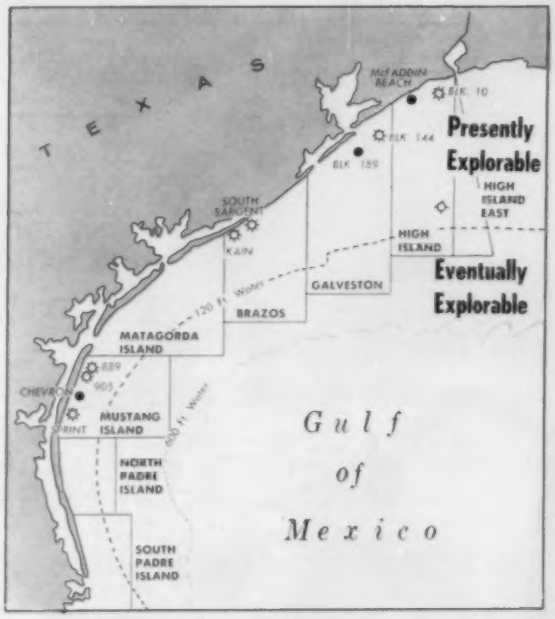
LOUISIANA has been 10 times as successful as Texas in the offshore oil search. That is to say, 10 times as many fields have been found. From the standpoint of quality and productivity, however, Louisiana's hundred or so discoveries overshadow the 10 off Texas more in the ratio of 100 to 1.

As for drilling, the 10-to-1 ratio still holds—1,300 completions off Louisiana, compared to 120 off Texas. Current activity, however, shows a wider gap—103 rigs are whirling in Pelican waters, compared to only 5 off Texas. Here the ratio jumps to 20 to 1.

**A changing attitude . . .** Texans are hard put to explain the lack of success off their shores. When offshore drilling first began, optimism flamed from Brownsville to Port Arthur. "We'll find a band of production 10 miles out to sea that will be as prolific as the 10-mile belt that borders the gulf today." . . . That was the prevailing opinion.

Today, tempered by time and experience, Texas operators have traded glee for gloom. A few short years have completely changed their attitude. They eye their shores with suspicion, for the drilling that has been done has produced no seaward Spindletop, no submerged Seeligson. Only three oil fields and seven gas fields have been found, and from them, offshore operators are reaping less than 2,000 bbl. of oil per day; most of the gassers stand shut in. In contrast, Louisianans are gathering 136,000 bbl. of oil a day, 16 per cent of the state's total production. In short, the only shining spot off Texas' shore is the sun on the surf.

**And slim success . . .** When viewed numerically, the record of success is not too bad. . . . Of the 120 wells completed, 41 (12 oil and 29 gas) have made producers. But the reserves they represent are far below those successes in Louisiana. Texans find, not the thick rich sands alternating with shales to trap oil, as in Louisiana, but rather, massive sand sections with no shale layers, or sands only a few hundred feet thick, alternating with massively thick shales that get ever thicker seaward. They find structures, but not oil. Geologists have not come up with a satisfactory explanation of the situation, but theories fly thick and fast. Perhaps the most common one holds that oil and gas migrated updip before the structures were formed . . . but many geologists term this one more an excuse than an explanation. Others point to the historically poor performance of Miocene fields in onshore Texas (Clam Lake, Caplen, and others) . . . again, this sounds more like excuse than explanation.



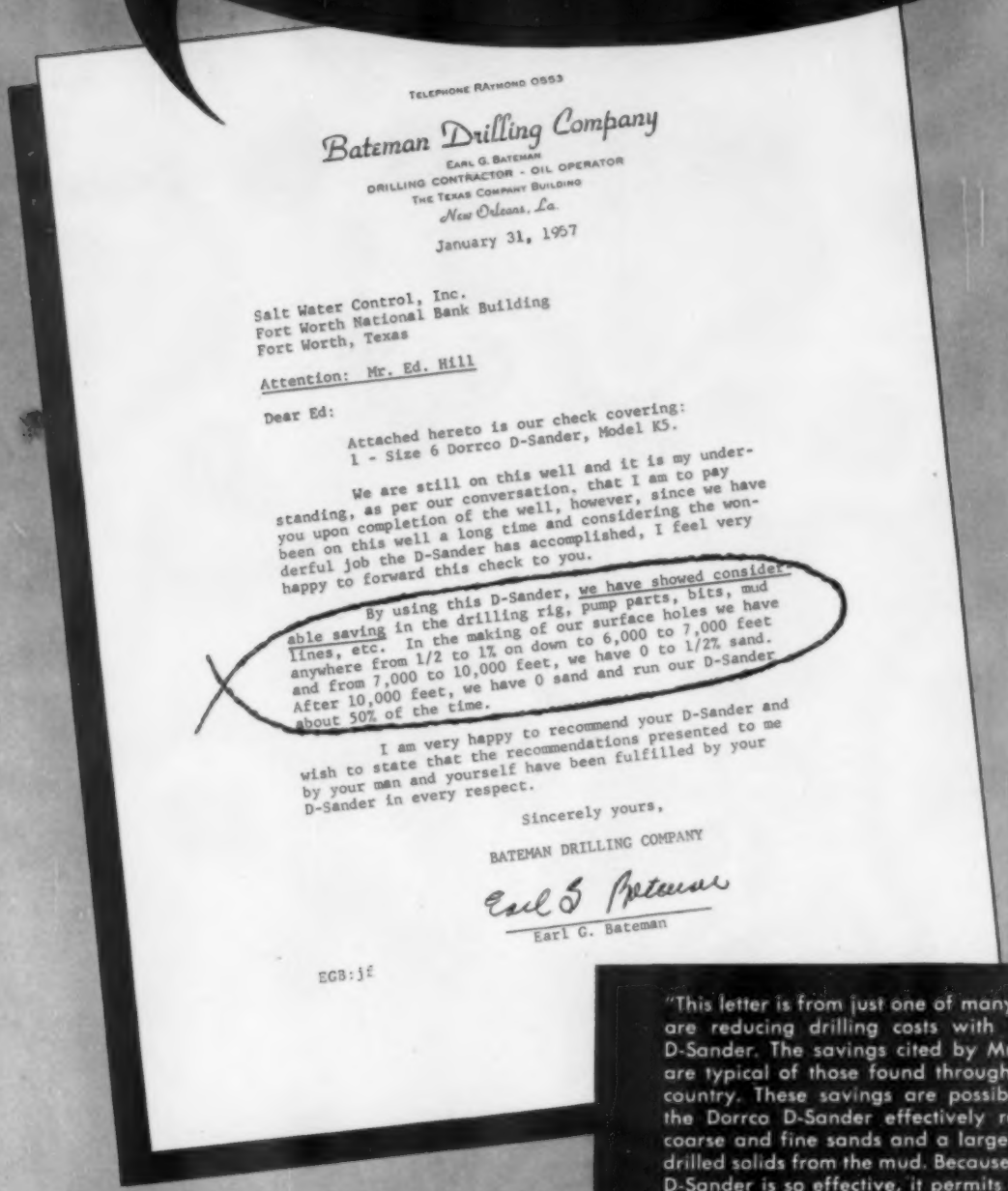

**ONLY 10 FIELDS have been discovered in Texas tidelands; of these, 7 are gas fields, 3 are oil. The dry hole "63" in the High Island area is so called because it lies 63 miles from shore, farthest seaward operation so far.**

It seems reasonable to assume that eventually Gulf Coast geologists will reach a sound theory of oil occurrence for these submerged structures; perhaps they will find that reservoir and trap relations may completely change to seaward. Perhaps the onshore conditions that have guided their activities so far do not apply out there. Only one broad premise seems to hold: that off the lower coast (in Railroad Commission Districts 2 and 4), traps and pools must flirt with faults; and that off the upper coast (in District 3), the domal uplift must prevail. After all, it took a decade for onshore operators to grasp the enormity of some South Texas fields, simply because the "picture" didn't fit a preconceived idea.

**Have little to go on . . .** Actually, the geologist still has little to go on, with 120 holes scattered over 16 million acres of explorable offshore targets. History shows that structure alone is not enough; there must be records, logs, and theories; there must be drilling, much more than offshore Texas has so far seen. "That's easy to say," one operator remarked, "but when you think of the cost, it's not so easy to do; look at the multimillion failure out at '63' (see map), and you can understand why those logs we need will be slow to come."

True, but there's nothing like a little success to spawn success. And with 50 or more operators poised on offshore leases, Texas can anticipate that success . . . perhaps not like Louisiana's, and perhaps not in the usual Texas proportions, but success at least.

# "...we have showed considerable saving..."



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**Bateman Drilling Company**

EARL G. BATEMAN
DRILLING CONTRACTOR - OIL OPERATOR
THE TEXAS COMPANY BUILDING
New Orleans, La.

January 31, 1957

Salt Water Control, Inc.
Fort Worth National Bank Building
Fort Worth, Texas

Attention: Mr. Ed. Hill

Dear Ed:

Attached hereto is our check covering:
1 - Size 6 Dorrco D-Sander, Model K5.

We are still on this well and it is my understanding, as per our conversation, that I am to pay you upon completion of the well, however, since we have been on this well a long time and considering the wonderful job the D-Sander has accomplished, I feel very happy to forward this check to you.

By using this D-Sander, we have showed considerable saving in the drilling rig, pump parts, bits, mud lines, etc. In the making of our surface holes we have anywhere from 1/2 to 1% on down to 6,000 to 7,000 feet and from 7,000 to 10,000 feet, we have 0 to 1/2% sand. After 10,000 feet, we have 0 sand and run our D-Sander about 50% of the time.

I am very happy to recommend your D-Sander and wish to state that the recommendations presented to me by your man and yourself have been fulfilled by your D-Sander in every respect.

Sincerely yours,

BATEMAN DRILLING COMPANY

Earl G. Bateman

Earl G. Bateman

EGB:jf

"This letter is from just one of many users that are reducing drilling costs with the Dorrco D-Sander. The savings cited by Mr. Bateman are typical of those found throughout the oil country. These savings are possible because the Dorrco D-Sander effectively removes all coarse and fine sands and a large portion of drilled solids from the mud. Because the Dorrco D-Sander is so effective, it permits substantial savings in areas where normal sand and solids contents were formerly considered low. Contact Salt Water Control for more information and arrange for a trial on your own operations."

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**Microfilming's magic, plus modern seismogram library, give members . . .**

# Seismic Profiles, at $2 Each

## . . . Today's big geophysical bargain

**By Norman S. Morrisey**
**Drilling-Development Editor**

HOW WOULD you like to double your present seismic coverage at a cost of only $2 per profile? Surprisingly enough, this opportunity is now open to any interested oil company through a seismogram lending library in Dallas, Seismogram Library Corp.

Oil companies are beginning to realize that seismic work can be exchanged successfully to the mutual benefit of all parties concerned. This procedure has been in vogue for years with electric logs, although at first these logs were treated as highly confidential information. Now electric logs are available to anyone who wants to purchase the information. And the attitude toward seismic data is changing. At first the idea of a seismic lending library was not widely accepted. The usual reaction was "I'd have a lot of explaining to do to management if someone else reviewed our company's seismic work and found an oil field."

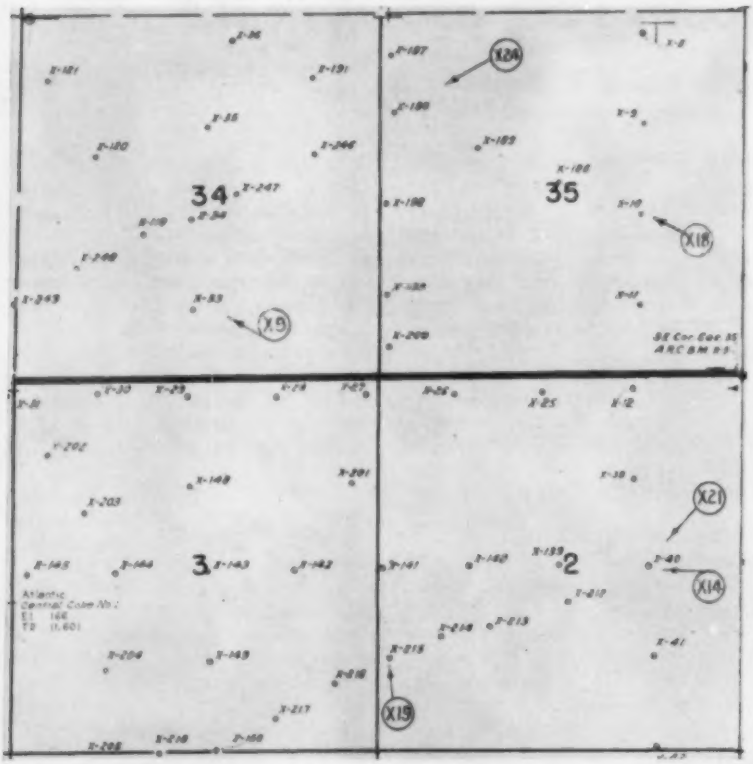
But management is the very group that endorses the idea. Discoveries are usually the result of reworking library data from one or more companies and doing additional shooting in the area of interest. The geophysicists often are reluctant to sort out the material to be given the library but are enthusiastic once they have joined, according to Morris G. Spencer, president of Seismogram Library Corp.

How does the lending library work? Any oil company or operator can become a member by contributing a minimum of 5,000 profiles to the library. In return, the company can then check out as many profiles from the library as it has donated. If a company donated 50,000 records, it would then have a credit of 50,000 records with the lending library. The library reproduces the seismic records on microfilm and returns the original records to the oil company.

Any time that a member wants records in a particular area, the library runs off a set of photographic prints from the microfilm. The member pays the library a nominal charge for the duplicating. Of course, the oil-company representative has the opportunity to examine the seismic coverage and microfilms to be sure that the seismic records will be of use to him in his study of a particular area. And by the same token, the Seismogram Library has the privilege of reviewing the records that a company wants to contribute before accepting the records. In this way, the library insures that the records will be of value to its members and also it avoids duplication of coverage.

**Is it useful? . . .** Members can find many ways to fit the additional seismic data at the library into their exploration program. Suppose XYZ Oil Co. joins the library by contributing 30,000 records. In checking the catalog of seismic records available, XYZ discovers that several of its blocks of acreage have already been shot. They can order up the records in these areas and, if the coverage is adequate, evaluate their blocks without going to the expense of shooting the prospects themselves. Undoubtedly, the review

**FINAL STAGE** in preparing records for a member. The prints are trimmed to standard size and immediately shipped.




**PORTION** of a shot-point map of South Louisiana shows the type of coverage available to members of the library.

of the library records will assist XYZ in determining which blocks to process by additional shooting and which to drop.

Let's say that XYZ gets a submittal covering 3,000 acres in Kiowa County, Oklahoma. They check the catalog and find records are available on the prospect. XYZ can order records from the library and evaluate the submittal.

**Seismic reviews invaluable . . .** The Seismogram Library makes review work a very inexpensive way of finding new oil reserves. Invariably a combined geological-geophysical study of an old area will uncover new leads. The old geophysical work was probably designed to find structural closure. Today's exploration thinking is aimed at finding strat traps. Combining the old shooting with new geological thinking should result in more new oil. Weak structural leads that were not worth drilling in the past may provide the necessary relief to make a strat play economic.

Or possibly the early shooting was aimed at mapping reliable shallow reflections and the weak deeper data were ignored. A geological-geophysical review tied to additional well control could provide new prospects.

Most of the records in the library have been shot within the last 10 years, and it is the policy of the library not to accept any material which would not benefit the industry.

And all these studies can be carried out at a minimum cost to the members of the Seismogram Library.

**Library coverage expanding rapidly . . .** Seismogram Library already has 40 oil companies as members and has coverage in nearly all the important oil-producing states as well as some coverage offshore and in Canada. Of course, the library does not have blanket coverage, but its catalogs list over 250,000 profiles. Some companies are even using the library's microfilm service to duplicate and store their own seismic records. And the library has facilities for storage of both records and microfilms.

**Accurate reproduction . . .** The library has designed a reliable and accurate method of duplicating the seismic records through a photographic process. The operator can run off either standard-size seismic records from the microfilm or small-scale reproductions. The latter are becoming more popular, according to Spencer, since they are easier to handle for regional studies and seismic section work.

Detailed maps are available showing the seismic coverage on each area as well as the type of shooting. **End.**

# 50 Years in OKLAHOMA

**IN MAY, 1907**

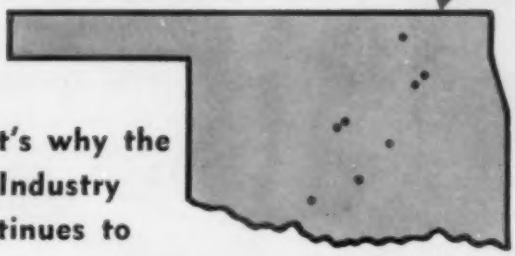
Scene in front of Bovaird Supply Company's store at Sapulpa, Oklahoma, back in 1907

In May, 1907, Bovaird opened its first Oklahoma store in Sapulpa before Statehood.

We are proud to have served the Oil Industry in Oklahoma since May, 1907 . . . six months before Statehood. We now have eight stores and offices in Oklahoma.

We appreciate the confidence, friendship, cooperation and patronage of the constantly growing Oil Industry in Oklahoma, Illinois, Kansas, Texas, New Mexico and Colorado where our 28 stores and offices are privileged to serve the industry.

**IN 1957 BOVAIRD HAS 8 OFFICES AND STORES IN OKLAHOMA**



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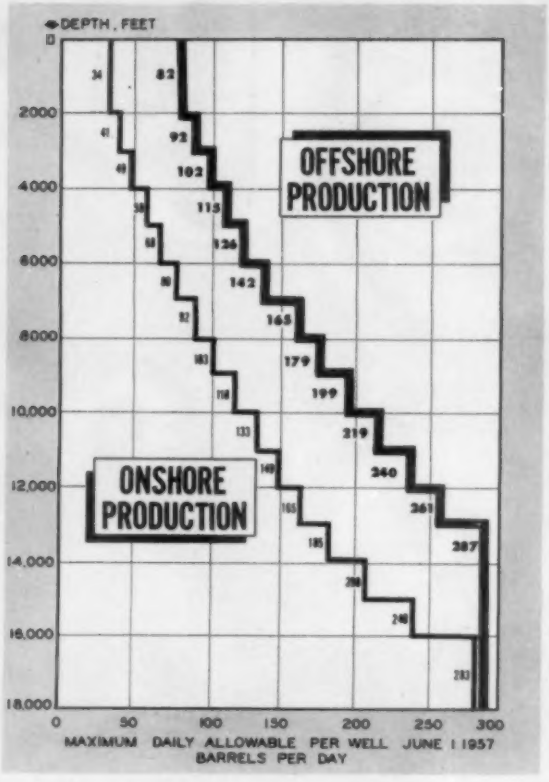



# Offshore Allowables Help Offset Risks

## . . . In shallow depths the offshore-onshore ratio is 2 to 1

**By Norman S. Morrisey**
**Drilling-Development Editor**

HOW does offshore production compare to onshore? Present daily allowables permit offshore operators to produce about twice as much as onshore wells in the shallow to intermediate depth zones. Below 5,000 ft. however, the gap in allowables decreases. Actually the greater offshore allowables are needed to offset the tremendous costs and risks and provide a much-needed incentive for offshore exploration and development.

Daily offshore oil production off South Louisiana now stands at 136,400 bbl., according to the allowable schedule effective June 1. This output is down from the March figure of 166,000 bbl., but offshore production is climbing steadily. Compare the June 1955 production of only 59,000 bbl. with today's allowable and you discover the daily output has more than doubled in the past 2 years. The Suez situation temporarily boosted the offshore production above its normal level, but even without this increase, there is no question that the offshore wells are becoming a significant part of Louisiana's total production.

Louisiana's total allowable for June is 861,927 bbl., with 16 per cent from the offshore wells. In June 1955, offshore production was only 9 per cent of the total production of the state.

Who are the big offshore producers?

**TABLE 1—MAXIMUM DAILY ALLOWABLES BY DEPTHS—LOUISIANA**
(Barrels per day)

| Depth range (ft.) | Onshore | | Offshore | |
|---|---|---|---|---|
| | January 1, 1955 | June 1, 1957 | January 1, 1955 | June 1, 1957 |
| 0- 2,000 | 42 | **34** | 138 | **82** |
| 2,000- 3,000 | 49 | **41** | 148 | **92** |
| 3,000- 4,000 | 59 | **49** | 159 | **102** |
| 4,000- 5,000 | 70 | **58** | 169 | **115** |
| 5,000- 6,000 | 83 | **68** | 185 | **126** |
| 6,000- 7,000 | 97 | **80** | 200 | **142** |
| 7,000- 8,000 | 111 | **92** | 221 | **163** |
| 8,000- 9,000 | 124 | **103** | 242 | **179** |
| 9,000-10,000 | 142 | **118** | 263 | **199** |
| 10,000-11,000 | 161 | **133** | 283 | **219** |
| 11,000-12,000 | 180 | **149** | 304 | **240** |
| 12,000-13,000 | 199 | **165** | 325 | **261** |
| 13,000-14,000 | 224 | **185** | 351 | **287** |
| 14,000-15,000 | 251 | **208** | 351 | **287** |
| 15,000-16,000 | 290 | **240** | 351 | **287** |
| 16,000 and below | 345 | **283** | 351 | **287** |

**TABLE 2—LOUISIANA OFFSHORE ALLOWABLES—EFFECTIVE JUNE 1, 1957**
(Barrels per day)

| | Field | Calif. Co. | Phillips | Hum-ble | C.A.T.C. Group* | Kerr-McGee | Ocean Drlg. | Mag-nolia | Texas | Gulf | Forest | Shell | Pure | Mecom | Henry Cham-pagne |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Houma district: | | | | | | | | | | | | | | | |
| Bay Marchand, Block 2 | 11,504 | 11,341 | 163 | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... |
| Grand Isle, Block 15 | 1,886 | .... | .... | 1,886 | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... |
| Grand Isle, Block 18 | 4,778 | .... | .... | 4,778 | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... |
| Grand Isle, Block 47 | 1,314 | .... | .... | .... | 1,314 | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... |
| Ship Shoal, Block 32 | 82 | .... | .... | .... | .... | 82 | .... | .... | .... | .... | .... | .... | .... | .... | .... |
| Ship Shoal, Block 67 | 55 | .... | .... | .... | .... | .... | 55 | .... | .... | .... | .... | .... | .... | .... | .... |
| Ship Shoal, Block 72 | 772 | .... | .... | .... | .... | .... | .... | 772 | .... | .... | .... | .... | .... | .... | .... |
| Ship Shoal, Block 113 | 59 | .... | .... | .... | .... | .... | .... | 59 | .... | .... | .... | .... | .... | .... | .... |
| Ship Shoal, Block 154 | 3,956 | .... | .... | .... | .... | .... | .... | .... | .... | 3,153 | 803 | .... | .... | .... | .... |
| South Pelto, Block 20 | 239 | .... | .... | .... | .... | .... | .... | 239 | .... | .... | .... | .... | .... | .... | .... |
| South Timbalier, Block 54 | 219 | .... | .... | 219 | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... |
| Lafayette district: | | | | | | | | | | | | | | | |
| Eugene Island, Block 18 | 2,188 | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | 2,188 | .... | .... | .... |
| Eugene Island, Block 32 | 856 | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | 856 | .... | .... |
| Eugene Island, Block 45 | 657 | .... | .... | .... | .... | .... | .... | 657 | .... | .... | .... | .... | .... | .... | .... |
| Eugene Island, Block 126 | 7,938 | .... | .... | .... | .... | .... | .... | 7,938 | .... | .... | .... | .... | .... | .... | .... |
| Eugene Island, Block 128 | 2,631 | .... | 140 | .... | .... | .... | .... | 1,379 | .... | .... | .... | 1,112 | .... | .... | .... |
| Lake Charles district: | | | | | | | | | | | | | | | |
| West Cameron, Block 33 | 15 | .... | 15 | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... |
| West Cameron, Block 45 | 888 | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | 888 | .... |
| New Orleans district: | | | | | | | | | | | | | | | |
| Breton Sound, Block 20 | 1,180 | .... | .... | .... | .... | 1,180 | .... | .... | .... | .... | .... | .... | .... | .... | .... |
| Breton Sound, Block 32 | 207 | .... | .... | .... | .... | 207 | .... | .... | .... | .... | .... | .... | .... | .... | .... |
| Eloi Bay | 96 | .... | 96 | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... |
| Main Pass, Block 24 | 108 | 108 | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... |
| Main Pass, Block 25 | 139 | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | 139 |
| Main Pass, Block 35 | 10,696 | 5,247 | .... | .... | .... | .... | .... | .... | 1,304 | .... | .... | 4,145 | .... | .... | .... |
| Main Pass, Block 41 | 163 | 163 | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... |
| Main Pass, Block 69 | 19,320 | 10,264 | .... | .... | .... | .... | .... | .... | .... | .... | .... | 9,056 | .... | .... | .... |
| South Pass, Block 6 | 40 | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | 40 | .... | .... | .... |
| South Pass, Block 24 | 48,440 | 19,612 | .... | .... | .... | .... | .... | .... | 1,877 | .... | .... | 26,951 | .... | .... | .... |
| South Pass, Block 27 | 5,481 | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | 5,481 | .... | .... | .... |
| South Pass, Block 41 | 275 | 143 | .... | .... | 132 | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... |
| West Delta, Block 30 | 6,988 | 3,518 | .... | 2,534 | 936 | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... |
| West Delta, Block 52 | 326 | .... | .... | .... | .... | .... | .... | .... | .... | 326 | .... | .... | .... | .... | .... |
| West Delta, Block 53 | 1,826 | .... | .... | .... | 1,826 | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... |
| West Delta, Block 83 | 438 | 219 | .... | .... | 219 | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... |
| West Delta, Block 84 | 640 | .... | .... | .... | 640 | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... |
| Total | 136,400 | 50,615 | 414 | 9,417 | 5,067 | 1,469 | 55 | 11,044 | 3,181 | 3,479 | 803 | 48,973 | 856 | 888 | 139 |

*Continental Oil Co., Cities Service, Atlantic, Tidewater.

The June allowable schedule (Table 2) shows California Co. at the top of the list with Shell Oil Co. pressing it closely. These figures include production from both state and federal leases off the Louisiana coast.

**Drilling continues to climb . . .** Total offshore-well completions, an excellent barometer of drilling activity, are up nearly 50 per cent over the same figures in 1956. During the first 5 months of 1957, a total of 300 wells were completed, compared to only 202 during the same period of 1956.

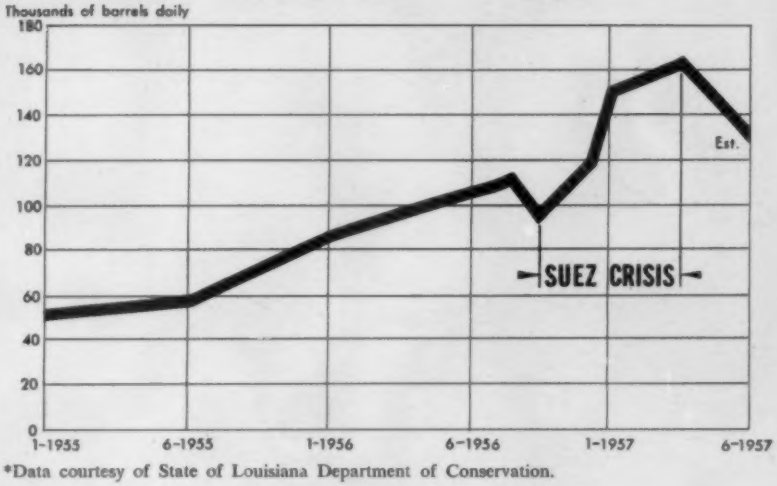
Offshore Louisiana is one of the few areas in the United States to show such a marked increase in drilling activity this year. Over-all figures for the United States show a decline of about 10 per cent in total well completions with most of the decline occurring in Illinois, Kansas, and Oklahoma.

Rig activity, too, in offshore waters is at a high level. Today there are 103 rigs busy in offshore waters. It now appears that there will be at least 700 completions in offshore waters in 1957 and a substantial increase in this figure for 1958.

Successful wildcat completions for 1957 in offshore Louisiana waters total eight oil, one distillate, three gas (Table 3). This includes new pays and some important extensions; 22 wildcats were plugged.

**Blue chip production . . .** Offshore Louisiana is one of the few places left in the United States where major oil fields are a distinct possibility in oil exploration. On land the large structures have long since been found. Offshore, operators are looking at an undeveloped oil province comparable to

## Average Daily Offshore Production*




*Data courtesy of State of Louisiana Department of Conservation.

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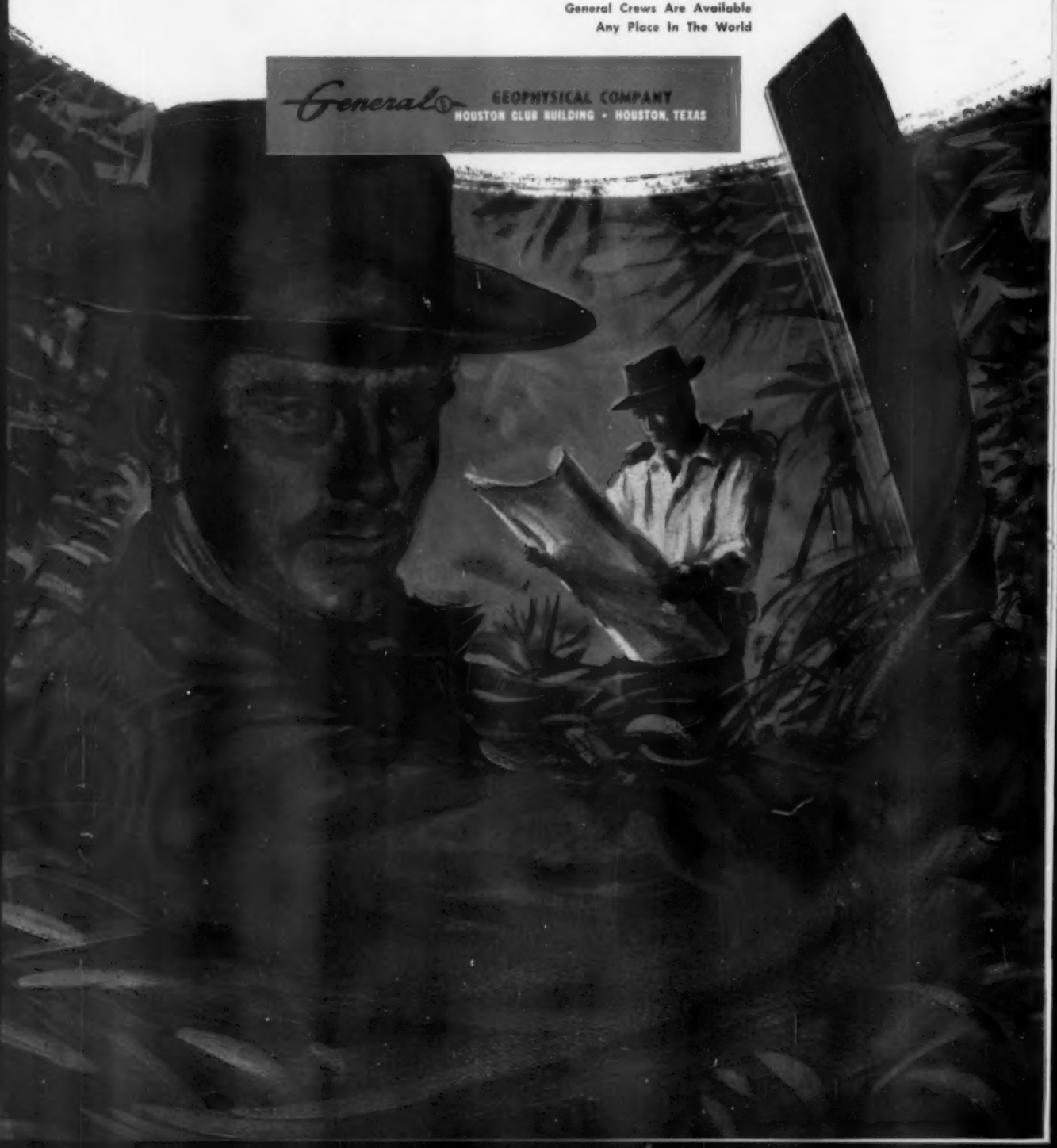


the Texas-Louisiana Gulf Coast of 30 years ago. At that time only a handful of the present reserves had been developed. The same statement is true today of the offshore area. Ultimate recoveries from offshore fields may eventually exceed 5.6 billion bbl. of oil. Only a small percentage of this reserve, about 1 billion barrels, has actually been found to date.

Operators already know that some offshore fields will have ultimate recoveries as high as 100,000 bbl. of oil per acre and fields with estimated recoveries of 50,000 bbl. per acre are not uncommon. Lush targets like this on land are hard to find.

Offshore production by any standards is blue-chip production! It takes a lot of money to find, lease up, and develop an offshore field. But the chances are that one out of every five offshore structures will develop into a giant field with at least 100 million barrels of recoverable oil. And the average offshore well should have reserves on the order of 2 million barrels of oil. That's why rig activity is at a high level, completions are up 50 per cent over 1956, and the offshore outlook is so bright.

Offshore drilling hazards are high. A hurricane like Flossie of 1956 can wipe out a 3 million dollar investment. And even the normal spring storms can wreck havoc. Mr. Gus, a multimillion dollar rig, became salvage overnight because of the weather —worst enemy to offshore operations. Add to these problems those of producing offshore fields and you soon discover why even the major oil companies form syndicates to spread risks when they decide to get their feet wet in offshore operations.

**TABLE 3—SUCCESSFUL LOUISIANA WILDCATS**

January 1-May 31, 1957

**Cameron Parish**

Natural Gas & Oil Corp. et al 1 State Lease 1172, East Cameron Block 9. IPF 32 BOPD, 3,150 M.c.f. of gas per day, 16/64-in. choke. Perfs. 12,902-20 ft.; 43 BOPD, 3,200 M.c.f. of gas per day, 16/64-in. choke, Perfs. 13,-056-13,120 ft. TD 13,440 ft. Dual gas discovery.

California Co. 2-A OCS 0541, East Cameron Block 160. IPF 115 BOPD, 148 M.c.f. of gas per day, 4/64-in. choke. Perfs. 11,-303-39 ft. TD 12,303 ft. New oil sand discovery.

California Co. A-3 OCS 0542, East Cameron Block 160. IPF BOPD, 2,000 M.c.f. of gas per day, 12/64-in. choke. TD 11,152 ft. New gas pay sand.

**Lafourche Parish**

Gulf Refining Co. 1-D Louisiana State Lease 1423. IPF 404 BOPD, 7/64-in. choke. Perfs. 10,615-43 ft. TD 11,000 ft.; 380 BOPD, 7/64-in. choke. Perfs 10,216-30 ft. Dual oil discovery in South Timbalier 21.

Sinclair 1-A OCS 0605, South Timbalier Block 86 discovery. IPF 336 BOPD, 369 M.c.f. of gas per day, 12/64-in. choke. Perfs. 12,167-83 ft. TD 12,250 ft. Oil discovery.

**Plaquemines Parish**

The California Co. 1 State Lease 1263 OCS 0374, Main Pass Block 41 area. IPF 210 BOPD, 291 M.c.f. of gas per day, 9/64-in. choke. Perfs. 7,091-7,115 ft. TD 9,235 ft. New oil pay.

The California Co. 1 OCS 9378 State Lease 1275. IPF 174 BOPD, 28 M.c.f. of gas per day, 9/64-in. choke. Perfs. 6,848-52 ft. TD 9,004 ft. May be extension to Block 41 field.

**Terrebonne Parish**

California Co. 1 State Lease 774 OCS 070, Ship Shoal 107. IPF BOPD, 10/64-in. choke. Perfs. 9,414-25 ft. TD 12,002 ft. Oil discovery.

Gulf A-1 OCS 0498. IPF 95 BDPD, 12/64-in. choke. Perfs. 14,352-86 ft. TD 14-638 ft. New gas discovery in South Timbalier Block 128.

Gulf-Humble 4-A OCS 0462. IPF 345 BOPD, 10/64-in. choke. Perfs. 10,779-85 ft. TD 11,245 ft. Oil discovery in Block 128 area, South Timbalier, 29 miles offshore.

**Vermilion Parish**

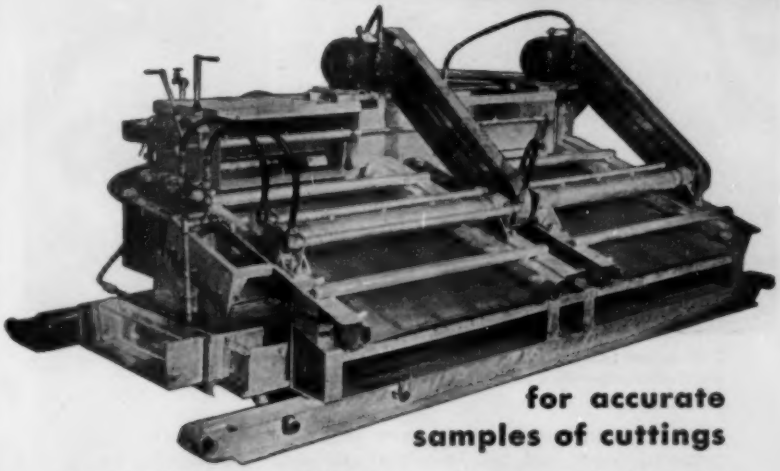
Continental 1-A OCS 0169 State Lease 1372. IP 1,270 M.c.f. of dry gas per day, ¼-in. choke. Perfs. 3,570-74 ft. TD 14,005 ft. Gas discovery in Vermilion Block 96.

Shell 1 Shell-Humble OCS 0493. IPF 220 BOPD, 99 M.c.f. of gas per day, 9/64-in. choke. Perfs. 6,758-72 ft. TD 8,493 ft. Block 164 oil discovery.

Because of the greater risks and higher costs of offshore wells, the maximum daily allowables per well are higher than for comparable depths on shore.


Thompson

DOUBLE VIBRATING SHALE SHAKER...and SAMPLE MACHINE



for accurate samples of cuttings

The THOMPSON SHALE SHAKER SAMPLE MACHINE offers the operator and geologist one of the best methods available for obtaining accurate foot-by-foot samples of well cuttings.

This THOMPSON DOUBLE VIBRATING SHALE SHAKER and SAMPLE MACHINE is specially engineered for off-shore barges or islands, deep wells, or wells using big volume and high pressure mud pumps. It is available either plain or galvanized, which makes it rust and deterioration-proof on offshore or coastal duty

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Thompson TOOL CO.

# Duff-Norton ball bearing screw jacks can't creep or drop—will hold loads indefinitely

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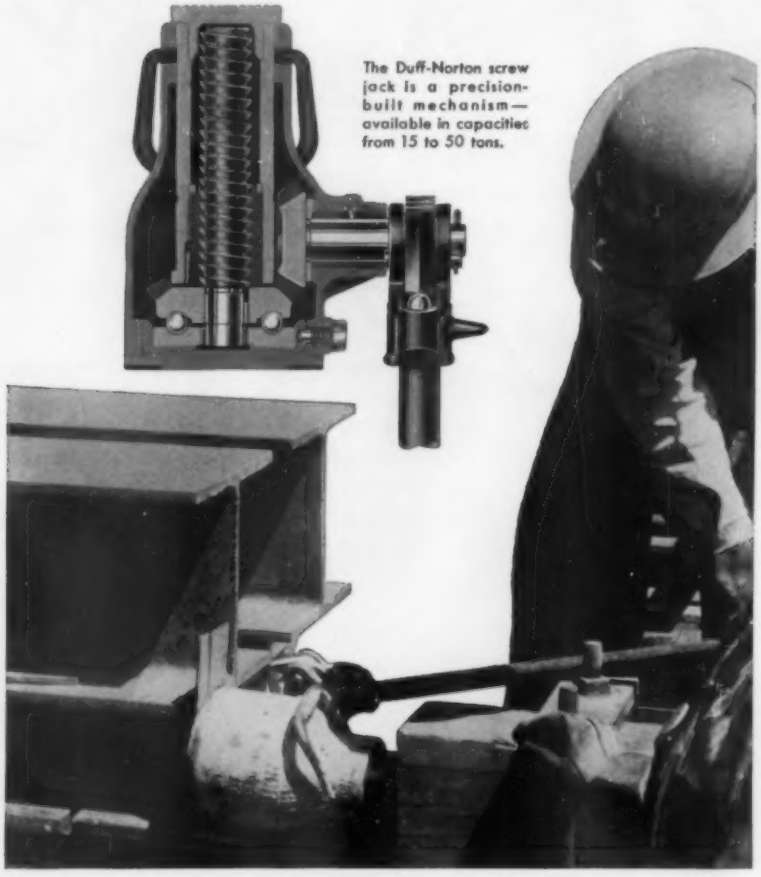

The Duff-Norton screw jack is a precision-built mechanism—available in capacities from 15 to 50 tons.

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| Toland Brine Service, Inc. | Kermit, Tex. |
| The Brine Co. | Midland, Tex.; Hobbs, N. M. |

# EXPLORATION HIGHLIGHTS

## APPALACHIAN

### OHIO

Two producers enlarge the New Guilford pool area in Perry Township, Coshocton County; the W. H. Bears et al 1 Elmer Mayberry, Section 7, a ½-mile extension, found the Clinton at 3,182-3,230 ft. and gaged 200 bbl. in a 7-hour test after fracture; Clinton Oil & Gas Co. 3 Arla Johns, Section 4, with sand at 3,251-90 ft. gaged 250 bbl. in 24 hours after fracture.

● Frank Brendel Oil & Gas 1 Max Johnson, Section 14, Jackson Township, Muskingum County, an outside location in Frazeysburg pool, made 495 bbl. in 24 hours after fracture Clinton at 3,167-3,216 ft.

● Ohio Fuel Gas Co., deepened their 1 M. M. Paxson, Section 17, Bearfield Township, Perry County, and found 1,100,000 cu. ft. natural in Clinton at 3,519,49 ft.

### PENNSYLVANIA

In Armstrong Township, Indiana County, Southwest Pennsylvania, New York State Natural Gas Corp. N-536 William George wildcat gaged 1,517,-000 cu. ft., gas after fracture. Chert 7,-579 ft., Oriskany sand 7,706-32 ft. The gas was found in both formations, TD 7,376 ft.

James Drilling Co., 1 August Stase is fishing at 1,420 ft., and the No. 2 D. M. Clawson, is drilling at 1,715 ft.

### WEST VIRGINIA

In Triadelphia district, Logan County, West Virginia, Perry Gas Co., completed a large gas well in the Big Lime. It was No. 1 Slone, gaging 23,-000,000 cu. ft., natural, TD 2,242 ft.

### EASTERN KENTUCKY

Northeast of the town of Sizerock and located on Left Fork of Elkhorn Creek, Leslie County, United Fuel Gas Co. is drilling at 5,370 ft. in probable Cambrian sediments. Top of Knox dolomite was found at 4,964 ft. from an elevation of 1,179 ft. Rose Run sand is reported at 5,330 ft. The Knox carried water from 5,320 to 5,330 ft.

## ARKANSAS

### May Exploration Nets Three Discoveries

Three new oil fields were opened in southern Arkansas during May. Two of the new areas were discovered by Milton Crow, Inc., and G. B. Christmas, both in Miller County. Barron Kidd and Tandem Drilling Co. reopened production in Union County's North Lisbon field.

**Christmas . . .** One of the busiest new areas in the state is at Christmas field. An east offset is in the pay zone, the south offset is staked, and a 3,500-ft. northeast outpost is spotted.

Milton Crow, Inc., and G. B. Christmas 1 Brown, C SW NW SW 17-16s-26w, completed pumping 130 bbl. of oil per day from the first Sturgis sand of Paluxy. Production is from perforations at 3,221-23 ft.

*(Continued on page 233)*

**Exploration This Week**


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The oil business moves fast in Western Canada . . . and U. S. oil men in this area need fast and dependable information for successful operations.

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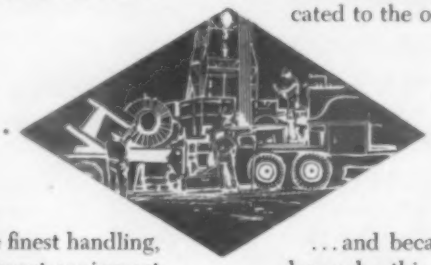

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HALLIBURTON'S "DV" MULTIPLE STAGE CEMENTER

. . . a tool for placement of two- or three-stages of cement behind one string of casing. Recognized as "the universal multiple-stage cementing tool" because of its efficient contribution to satisfactory primary cementing jobs.

Some of the many applications for this versatile tool are: (1) full depth cementing; (2) cementing off formations at any point; (3) reducing channeling; (4) reducing pump pressures; (5) dual zone well completion; (6) combating loss of cement slurry to thief formations.

GUARDS EXPOSED ZONE BELOW CASING
HALLIBURTON'S FORMATION PACKER SHOE

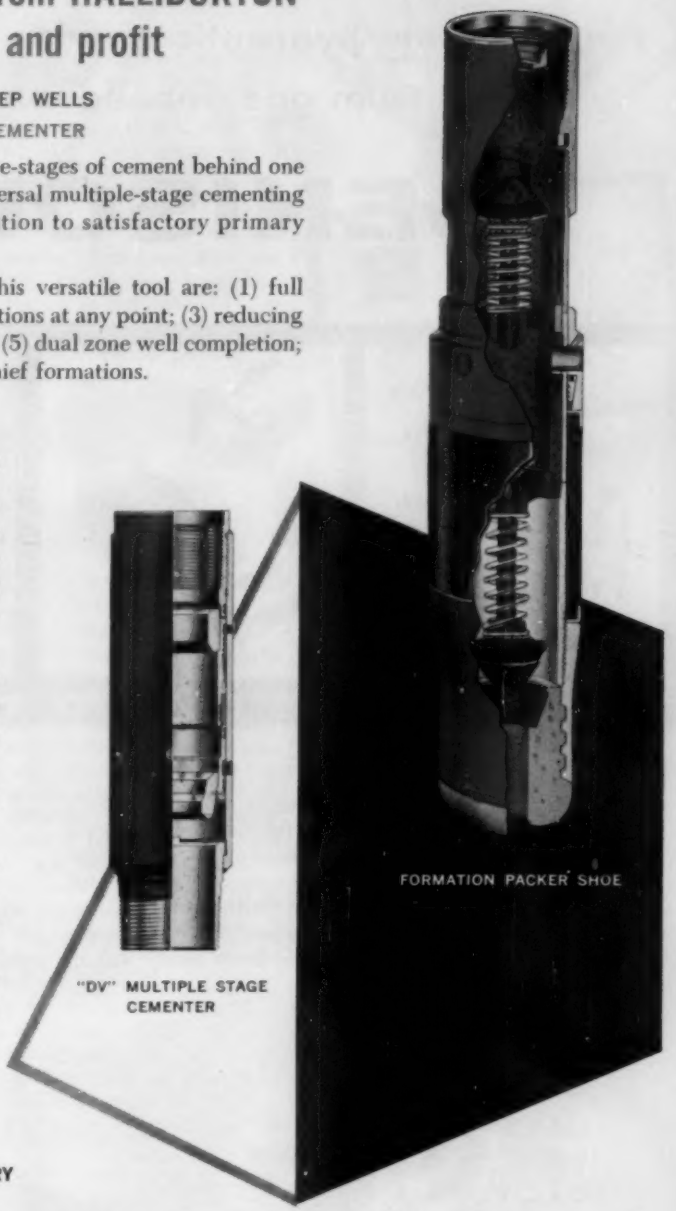
A Formation Packer Shoe installed on the first joint of a string of casing offers many advantages. This shoe is used in all areas where conditions require casing to be set on top of the producing formation, because:

(1) Packer Shoe packs off open hole below casing, protecting low-pressure formations from cement contamination during cementing.

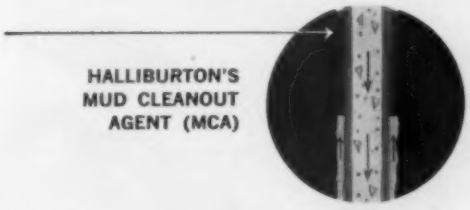
(2) Packer Shoe floats in and guides casing to bottom.

(3) Packer Shoe has a Super-Seal Back-Pressure Valve to keep cement slurry from backing up inside the casing above the Formation Packer Shoe.

(4) Packer Shoe provides circulation of fluids through end of Shoe until shoe packer rubber is expanded and set.




REMOVES MUD AHEAD OF CEMENT SLURRY




Laboratory tests indicate that Halliburton's MCA is the most efficient mud dispersant solution available. In primary cementing, MCA is used ahead of the cement slurry. It helps to clean out mud and soft filter cake in the annular space. This reduces the possibility of channeling and lets the cement bond better to the formation. Many other uses.

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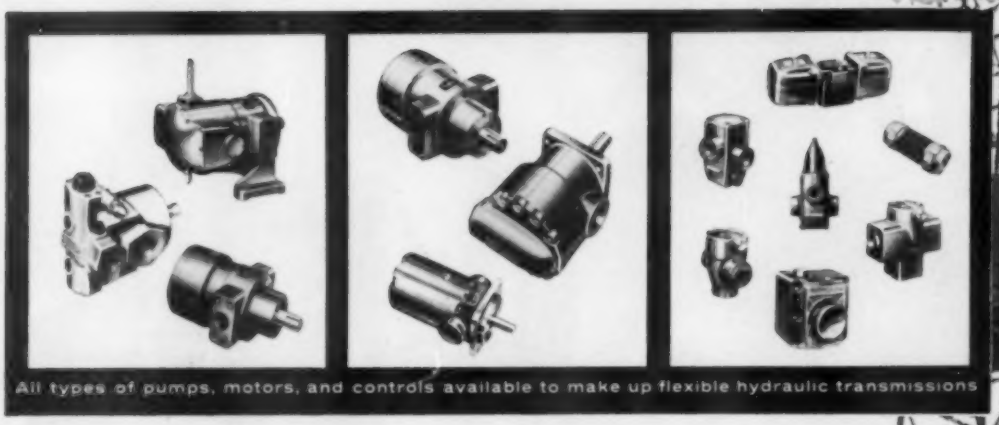

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## ARKANSAS

*(Continued from page 229)*

**Genoa . . .** The above operators report staking of a northeast confirmation try to their new Genoa field discovery in Miller County. The discovery well, 1 Young, C NW NW NW 15-16s-27w, 1½ miles southeast of Genoa, pumped 240 bbl. of oil per day from perforations at 3,388-91 ft. in the Paluxy.

**North Lisbon . . .** Barron Kidd reopened North Lisbon field production in Union County at 1 Tatum in C NE SE 26-16s-17w. The Blossom sand well made 47 bbl. of oil per day on pump from perforations at 6,592-98 ft.

## CALIFORNIA

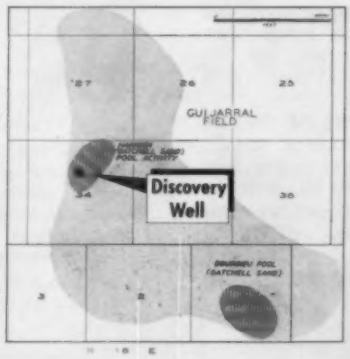
### Harnish Discovery Sets off Boom

L. A. Harnish's recent prolific Gatchell sand deep pool discovery in the Guijarral Hills field, Fresno County, has spurred three major companies to jump in with offsets.

Standard Oil Co. of California was grading location for a northeasterly extension about 2,000 ft. from the discovery. Sunray Mid-Continent Oil Co. had two rigs on offsets, one 500 ft. south and the other 1,000 ft. northeast of the discovery. Union Oil Co. was drilling on two tests aimed at the Gatchell pool about 1,000 and 1,500 ft. south of the discovery.

Harnish also was drilling two offsets, both less than 1,000 ft. north and northeast of the discovery well.

Touching off this activity was Harnish E53-34F Allison in SW-NE 34-20s-16e. This wildcat on the west edge of the central portion of the field found the Gatchell sand at 10,235-10,338 ft. Production has held up at 1,-




**Three majors have jumped into the Harnish discovery area in Guijarral Hills field with offsets.**

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B and W Inc.
For a good cement job

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000 bbl. daily with an undisclosed size choke. The crude is clean 30° gravity.

The nearest other Gatchell sand deep production is nearly 2 miles to the southeast in the Bourdieu pool in NW SE 1-21s-16e.

## New Fault Block Possible In Mount Poso Field

Intex Oil Co. was installing a pump on 2-21 Bowles in NW NW 21-26s-28e about 1,500 ft. north of the nearest producer in the Dominion area of Mount Poso field, Kern County. Test indicated this was probably a new fault block discovery in an oil sand at 1,499 ft.

## Another Big Well For Stenderup Pool

Union Oil Co. of California completed another big producer, its fifth in Stenderup pool at South Mountain field. This latest well, 35-21 Stenderup, is a southwest offset to the discovery. It flowed at a 1,340-bbl. daily rate on a 12-hour test of two intervals at 10,220-10,322 ft. and 10,342-10,424 ft. Total depth is 10,577 ft. Gravity of the crude was 29.4°.

The rig was being moved to the previously abandoned 10,662-ft. Bowlus-Schuman well about 500 ft. south of 35-21 Stenderup for a redrill job.

## Roberts Island Gas Field Extended Nearly Mile

Standard Oil Co. of California was preparing to complete 2-2 Woods Community in NE NE 26-1n-5e as an important extension ¾ mile southeast of Socal's Roberts Island gas field in San Joaquin County. It flowed 5,150 M.c.f. daily rate on a test of the interval 5,359-72 ft. through a 3/8-in. choke.

## New Zemorrian Producer At Wheeler Ridge

Richfield Oil Corp. has completed an extension of its Wheeler Ridge Community discoverey by bringing in 87-25 KCL F flowing 156 bbl. daily of 36.6°-gravity crude from a Zemorrian sand. The perforated intervals are 8,976-9,063 ft. and 9,063-72 ft. This well is in SE SE 25-11n-20w. Production also corresponds with Richfield's Zemorrian producer in the Windgap area discovered last year ½ mile south of 87-25 KCL F.

# CANADA

### ALBERTA

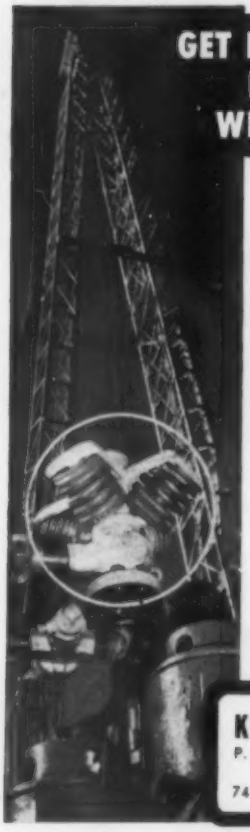
## First Oil Production Reported at West Whitecourt

The first oil production has been reported in the West Whitecourt area of Alberta on a production test of a new wildcat well.

The wildcat, Canadian Petrofina-Hudson's Bay-Pan American 15-25 Silvercreek, located in LSD 15, 25-60n-16w5, West Whitecourt, Alberta, flowed 50 bbl. of 43°-gravity oil an hour through a 24/64-in. choke in the latest production test. An earlier test recovered 57 bbl. of oil an hour through a 32/64-in. choke. Gas-oil ratio is 1,800.

Recovery on both tests was from the D-3 reef of Devonian age, topped at 8,464 ft. The well is 8,600 ft. deep. It is located about 6 miles northwest of the West Whitecourt discovery, which was completed as a gas and distillate producer.

The well is located on a 1.1 million-acre block owned by Pan American and Hudson's Bay Oil & Gas Co., Ltd., each with 42 per cent, and Canadian Petrofina, Ltd., with 16 per cent. Canadian Petrofina is operator.

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## ILLINOIS BASIN

### ILLINOIS

### Survey Releases May Drilling Report

Oil well drilling in Illinois remained at a low level in May, according to the Geological Survey. A total of 207 wells was completed in May, as compared with 319 in May a year ago.

Unfavorable weather conditions account for at least part of the slowdown. Oil well completions for the first 5 months of 1957 were only about 70 per cent as numerous as for the first 5 months of 1956. The 207 completions for May include 80 oil wells and three shut-in gas wells.

No new oil field was discovered. There was an extension to Eberle pool in Effingham County. Of 66 wildcat wells drilled, 65 were completed as dry holes.

Two new pays were discovered, a Pennsylvanian sandstone in Ab Lake pool in Gallatin County and the Trenton limestone in Fairman pool in Marion County. The latter is between 10 and 15 miles north of good Trenton production in the Centralia and Salem Consolidated pools and less than 3 miles south of recently discovered Trenton production in Patoka pool.

There has been no outstanding discovery (new pool or extension) for almost 1 year, and there is no concentrated area of development. Drilling at present consists of exploratory drilling and widespread development work in older pools. Lawrence and Crawford counties had the most drilling during May.

Production has not been seriously affected by the decrease in drilling, probably because of increasing recovery from water flooding. Monthly production is averaging about 350,000 bbl. less than for the corresponding month a year ago, or about 1½ days' production at the current rate of approximately 220,000 bbl. per day.

### Discovery Indicated In Williamson County

A new pool is in prospect at Ross Bartmes 1 H. H. Roberts et al in SE SE SW 21-8s-4e, 8 miles northeast of Marion in Williamson County.

The well recovered 355 ft. of clean pipeline oil, 190 ft. slightly mud-cut oil on drill-stem test at 2,886-92, 2,896-2,908 ft. in the Aux Vases sand.

In Lawrence County Paul S. Knight completed 1 Akin in SE NE NW 4-2n-11w, 2 miles north of St. Francisville. The well pumped 60 bbl. of oil per

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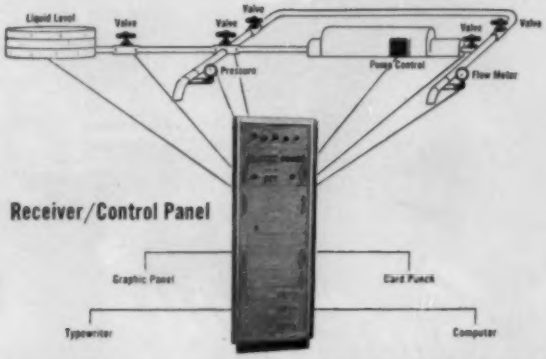


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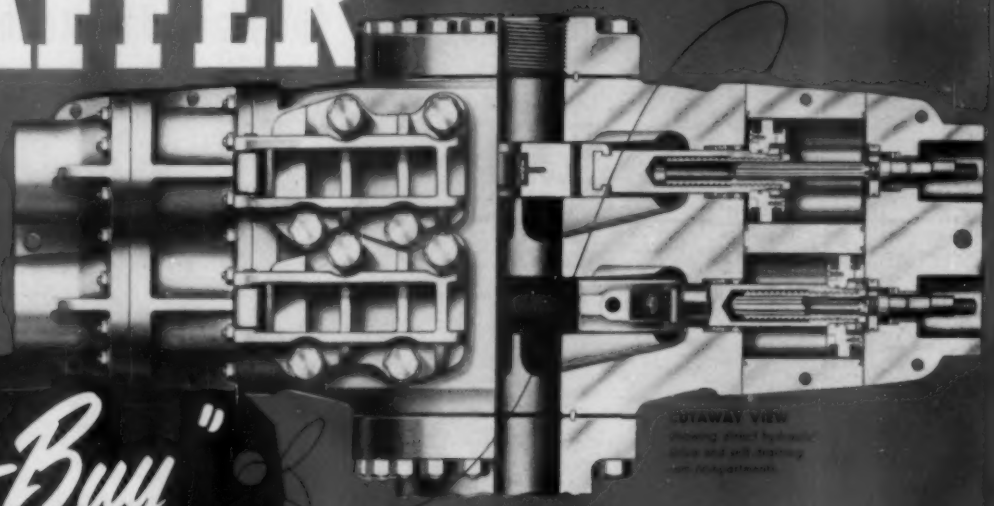

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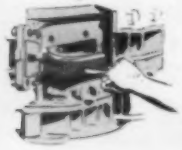

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day from 1,829-36 ft. in the McClosky lime.

In Hamilton County, 2 miles west of Walpole, Keystone Oil Co. 1 Burnett Unit, NE NE NE 1-7s-5e, flowed 600 bbl. of oil per day from Aux Vases sand at 3,180-3,210 ft. This prolific well was fractured.

### WESTERN KENTUCKY

## McClosky Discovery Finaled in Hopkins

An upper McClosky lime discovery well was completed in Hopkins County, 2 miles south of Mortons Gap in 15-I-25. The discovery well is Stouder Drilling Co. 1 Davis. It made 109 bbl. of oil and 14 bbl. of water per day on pump, natural. Production is from 2,115-69 ft.

# LOUISIANA

### NORTH LOUISIANA

## Grogan Field is Area's Most Active Development

The most active drilling area in the North Louisiana area is Grogan field in DeSoto and Natchitoches parishes.

The present drilling spree began last winter. Since then 31 locations have been staked, 10 completed as oilers from the Nacatoch formation. Production is from a shallow 1,250-ft. zone. There are 16 wells nearing completion in the field, five new locations staked.

### SOUTH LOUISIANA

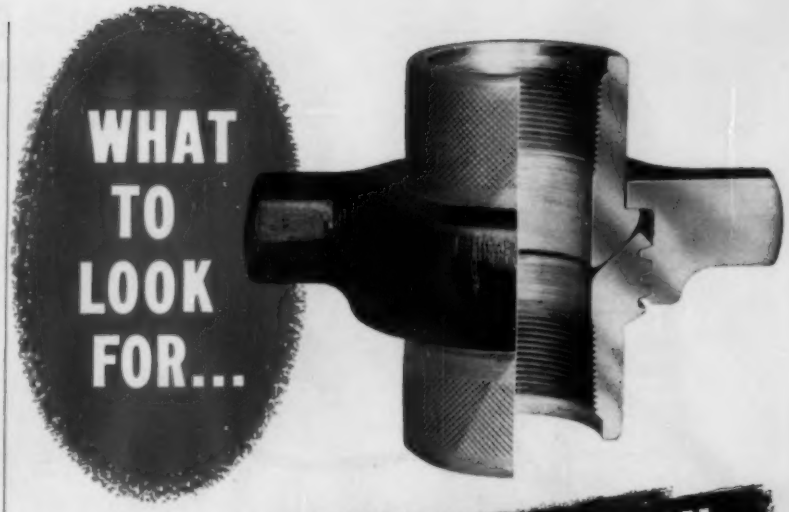
## South Timbalier-Block 21 Production Confirmed

Oil production at South Timbalier-Block 21 field was confirmed by Gulf Oil Corp. The D-2 OCS-0263 State Least 1423 was completed flowing at the daily rate of 354 bbl. on 8/64-in. choke from perforations at 10,690-10,702 ft.

## St. Mary Discovery Well Will Dually Complete

A dual completion is reported at Jett Drilling Co. and Southern Natural Gas Co.'s 1 St. Mary Bank & Trust Co. oil discovery, 1½ miles southeast of Patterson field in St. Mary Parish.

The well flowed 137 bbl. of oil per day from upper sand at 12,150-54 ft.; it made 263 bbl. of oil from the lower sand at 12,231-36 ft. Location of this new pool is in 39-15s-12e.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# Southern Cherokee County Gets Wildcat Action

**by Carl Hoot**
**District Editor**

FOUR exploratory tests are churning away in southern Cherokee County. Two of the four are taking a look at the deeper horizons and two are going to the Woodbine, or to around 6,000 ft.

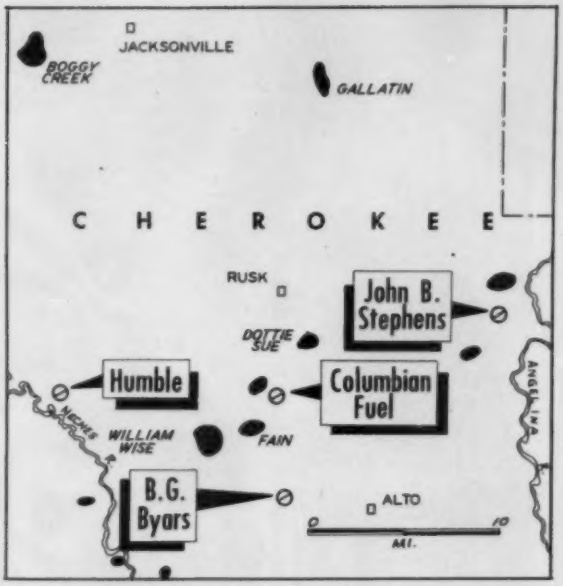
Last week, one of the Woodbine wildcats apparently had it made. Columbian Fuel Corp. 1 B. F. Alexander, 4½ miles south of the town of Rusk, found top of the Woodbine sand at 5,151 ft., on elevation of 515 ft. Operators cored 5½ ft. of porous sand with good odor, taste, and fluorescence at 5,155-67 ft., and another 1-ft. section was indicated by sidewall samples at 5,154-55 ft.

On drill-stem test at 5,145-60 ft., covering the above sand section, the well flowed mud in 25 minutes and oil in 35 minutes. Oil flowed but the amount was not estimated. Surface flowing pressure, using ¼-in. chokes top and bottom, was 390 psi.

Location of the new prospect is on a block of approximately 3,000 acres, in the Milton Burns Survey, A-123. Fain and Dottie Sue fields, nearby, have production in the Woodbine.

The second Woodbine operation, a new test, is B. G. Byars 1 E. M. Decker, located on a 91-acre tract in N. Crenshaw Survey, A-182, southeast of William Wise field. Projected depth is 5,500 ft.

Byars' well is on acreage taken on a farmout deal from Bracken Oil Co., with Humble Oil & Refining Co. said to be supporting the test with dry-hole money.




**These four tests in Cherokee County, Texas, have stirred new interest in deep wildcat drilling for that area.**

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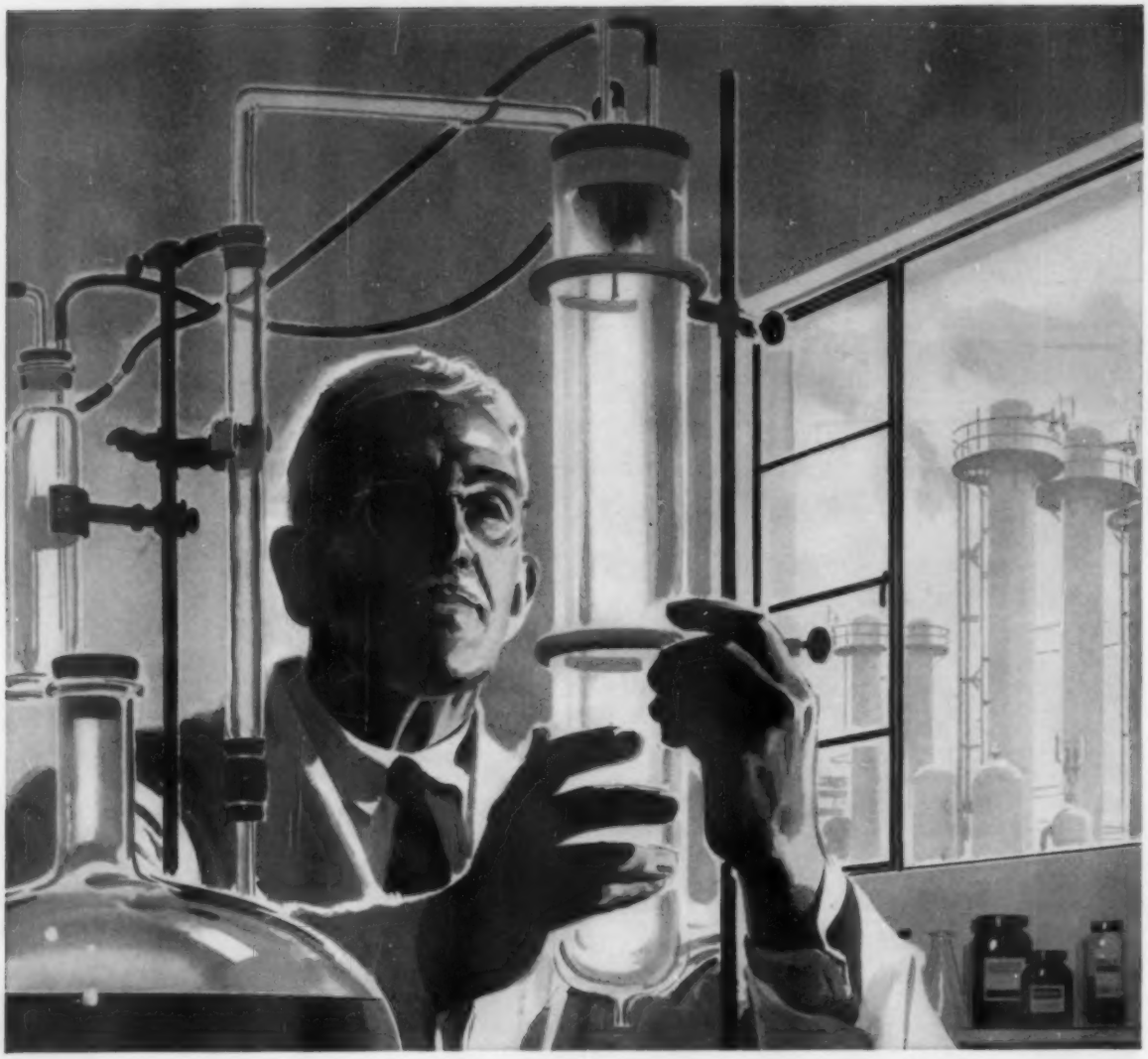

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Southern Pine Lumber Co., P. C. Latham Survey, A-964, was drilling below 3,575 ft. at last report. Location is 5 miles south of Maydelle. Projected depth is 11,300 ft.

On the eastern side of the county, John B. Stephens, Jr., 1 Maness was drilling below 8,706 ft., although early reports gave the well an 8,000-ft. contract depth. Gas shows have been reported around 8,600 ft. Location is in the J. M. Musquez Survey, 4 miles south of Reklaw. Sessions field, to the north, has production in the Woodbine.

## MICHIGAN

### Oil and Gas Logged At Crystal Wildcat

New Crystal Township wildcat, Oceana County, logged a Dundee oil and gas pay that was evaluated as being commercial, but drilling was being continued to the so-called Reed City zone pay objective before exhaustive testing is done in this shallower horizon.

This potential new Dundee discovery was drilled by Swan-King Oil Co., W. L. Harvey and Associates at the 1 Skidmore Land Co., SW NE NE 15-16n-16w.

Dundee top was logged at 2,496 ft. A big head of gas and considerable free oil showed from pay drilled between 2,498 and 2,514 ft. First gas pay was drilled at 2,498-2,508 ft. which was gaged at 620,000 cu. ft. after 1 hour. Additional gas and free oil showed at 2,508-14 ft. Well was making about 2 bbl. of water an hour from a lower Traverse porosity zone up the hole which appeareed to blanket pay zone to point where oil would not fill and flow. Well did spray considerable free oil during initial tests.

The 1 Skidmore Land Co. is located about 3½ miles southwest of Eden Dundee oil pool, Mason County, and about 1¼ miles east of the nearest Dundee gas well (no oil) in Crystal Valley pool, Oceana County. Structurally, new well is about flat with highest wells to the west.

## OKLAHOMA

### NORTHWEST

### West Laverne and Laverne Fields Linked by Dual Well

A dual gas completion between Harper County's West Laverne and Laverne fields links the two northwestern Oklahoma Pennsylvanian producing areas. The discovery is Sunray Mid-Continent Petroleum Corp. 1 Johnson in NW NW SE 32-26n-25w.

The well flowed 13,000 M.c.f. of gas per day on ¾-in. choke from Hoover sand perforations at 4,256-90 ft.; from the Tonkawa at 5,564-80 ft. it made 3,600 M.c.f. per day on same choke.

### Second Wilcox Discovery Noted in Eastern Woods

A wildcat in the extreme eastern part of Woods County is an apparent Simpson-Second Wilcox-Ordovician discovery. Amerada Petroleum Corp. 1 Krob, NW SE SW 24-25n-13w, just west of Cherokee-Pennsylvanian production in 19-25n-12w, took drill-stem test at 6,973-7,106 ft. The well flowed 157 bbl. of clean oil in 3 hours and 5 minutes. Later Amerada circulated out 3,000 ft. of oil.

This indicated new pool is northeast of Amerada's successful Oakdale field.

### SOUTH-CENTRAL

### Third Pay Indicated At South Rocky Point

Cleveland County's new South Rocky Point field appears to have a new and third pay zone at 6,700-52 ft. Oil


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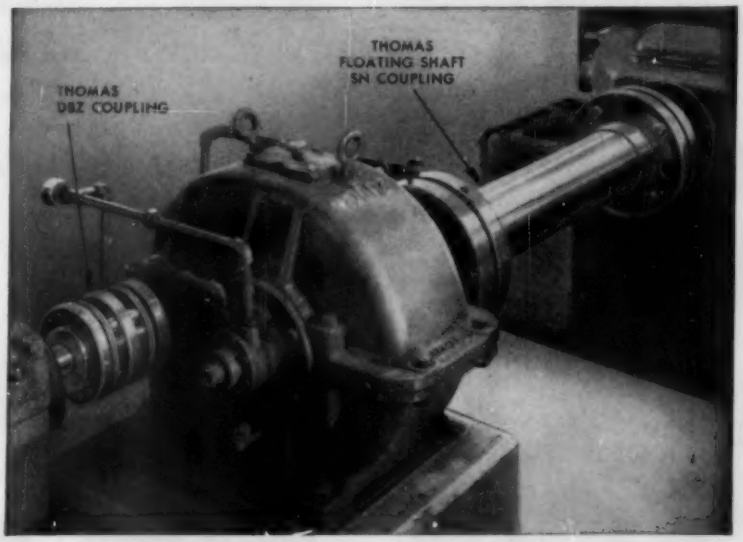


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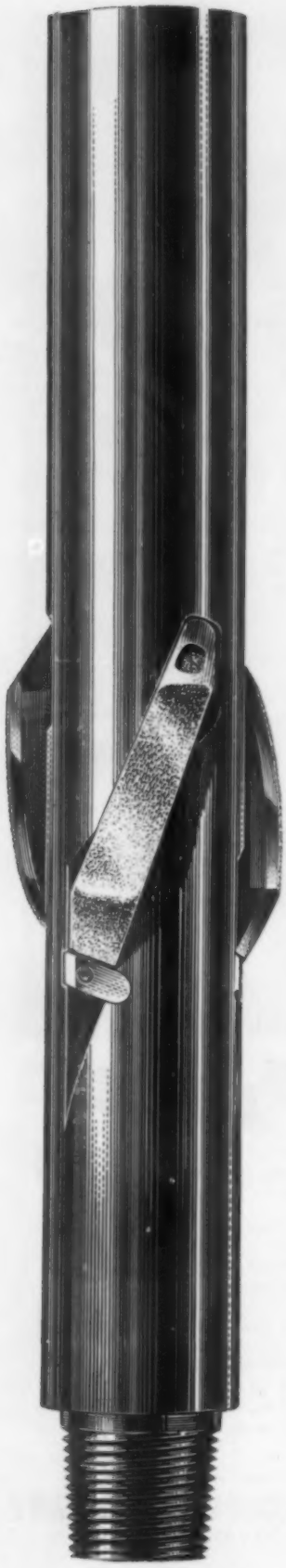

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Capitol Corp. 2 Allen, NW SE NE 32-8n-1w, recovered 70 ft. of oil, 120 ft. heavily oil and gas-cut mud and 90 ft. oil and gas-cut mud on test at 6,700-52 ft.

## OREGON

### Wildcat Slated for Sulphur Springs Area

General Petroleum Corp. has announced it will drill 1 Long-Bell, a wildcat SE SW 27-20s-10w, in Oregon. This is in the Sulphur Springs region of Douglas County approximately 40 miles southwest of Eugene. No spud date set yet.

## ROCKY MOUNTAIN

#### COLORADO

### New Raton Basin Wildcat Scheduled for Las Animas

A wildcat was announced for the Raton basin of southern Colorado last week. It is James M. Cunningham and R. J. Williams, Jr., et al 1 Earl Roberts, C SW NE 18-34s-61w, 11 miles east of the city of Trinidad in Las Animas County. Location of the 3,500-ft. Pennsylvanian try is about 3 miles east of shutin Garcia gas field.

#### NORTH DAKOTA

### Mission Canyon Discovery Completed in Bottineau

The northeastern rim of the Williston basin recorded a new discovery at Carter Oil Co. and Phillips Petroleum Co. 1 Fossum, C NE NE 31-162n-81w, Bottineau County.

The Mission Canyon well made 137 bbl. of oil and 86 bbl. of water daily on pump from perforations at 3,974-80 ft. This new pool-opener is located 10 miles southeast of Haas-Mission Canyon field and 11 miles southwest of Kuroki-Charles field.

#### MONTANA

### Sheridan County Gets Its Third Oil Discovery

The third discovery this year for northeastern Montana's Sheridan County was completed by Amerada Petroleum Corp. The 1 Ruegsegger, C NE NE 24-36n-52e, flowed 293 bbl. of oil and 157 bbl. of water per day on 11/64-in. choke from perforations at 9,067-71 ft. Production is from the Silurian, pay at the 1 Tange discovery which opened production in the county and in this section of the state earlier this year.

Location of this new field is 2 miles northwest of Outlook field and 3 miles northeast of 1 Loucks, a recent Red River-Ordovician discovery. There are two wells drilling in this area, the 1 West, a northwest extension to Outlook field, and 1 Grant, 10 miles northwest of Outlook field.

## TEXAS

#### NORTH TEXAS

### Sixth Pay Zone Opened In Stonewall County

Tompkins field in southern Stonewall County, in the news recently for having Cambrian production as a fifth pay zone, last week gained its sixth pay, in the Caddo.

Sun Oil Co. 4-A W. F. Martin, Section 136, Block 1, H&TC Survey, is a dual producer. It was first completed as an Ellenburger well, making 108 bbl. daily from pay at 5,833-59 ft. Operators then perforated the Caddo between 5,473-90 ft., completing on


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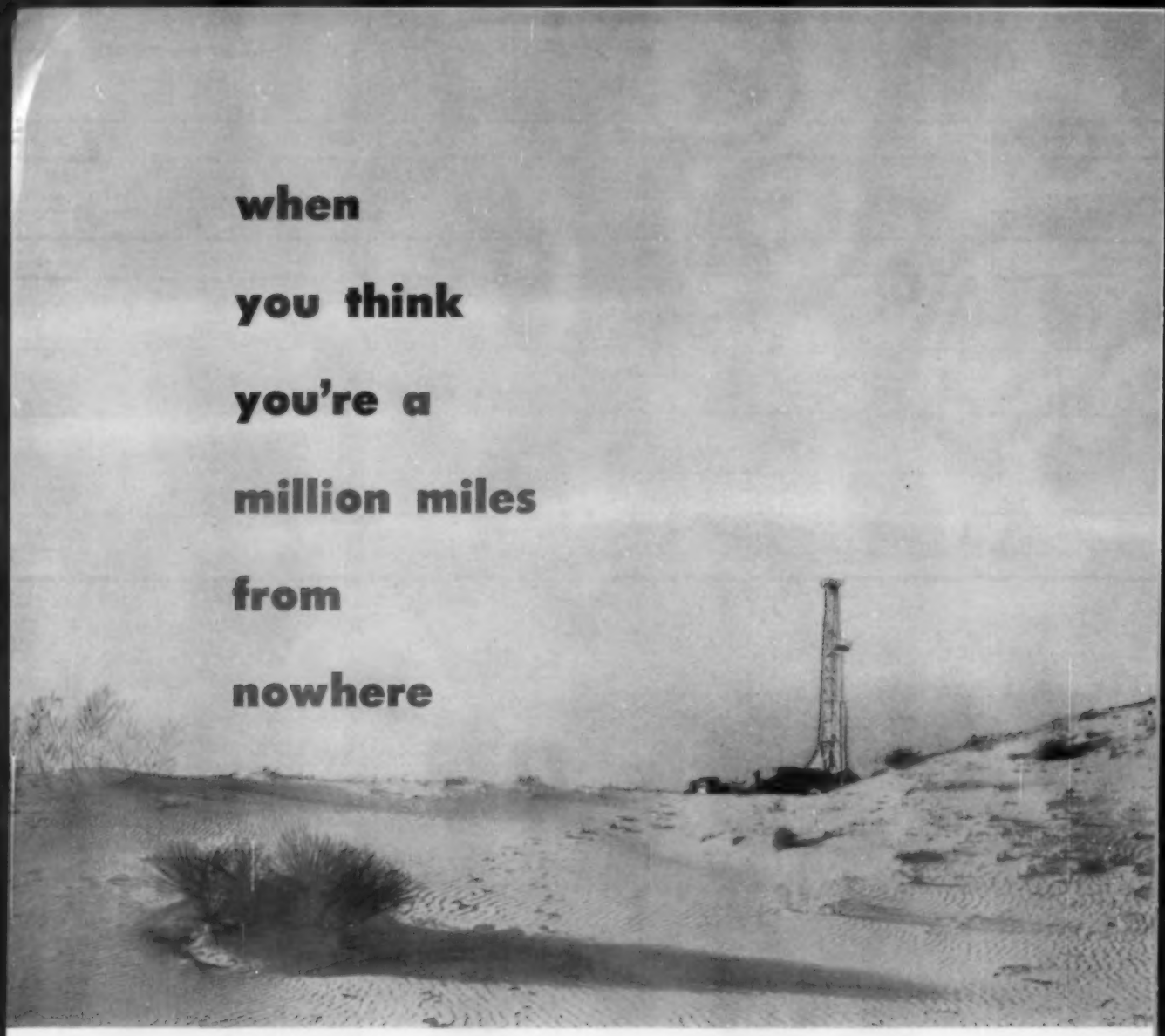


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the pump for 69 bbl. of 41°-gravity oil a day. Top of the Caddo was 5,473 ft. on ground elevation of 1,667 ft.

Other field pays are in the Strawn, Canyon, and Mississippian.

**Archer County discovery . . .** La Gorce Oil Co. 1 Joyce Prideaux Hornady, 7 miles east of Anarene in southeastern Archer County, has completed as a Mississippian opener. Initial potential was 210 bbl. of oil a day through 14/64-in. choke, under tubing pressure of 980 psi., and with gas-oil ratio of 500:1. Pay was perforated at 5,274-84 ft.

Location is in Section 1836, TE&L Survey, A-520.

### TEXAS GULF COAST

## Official Potential Taken At DeWitt Discovery Well

Harkins & Co. and George A. Musselman reported official potential was taken at their Wilcox discovery in District 2's DeWitt County. The 1 Musselman was tested for 103 bbl. of oil per day on 9/64-in. choke from perforations at 7,720-23 ft. Location is 4 miles northwest of Thomaston. The well is in the Green DeWitt Survey A-15.

## Galveston Bay Picks Up Another Oil Discovery

The Texas Co. 1 State Tract 235 is a new oil discovery 12 miles northeast of the city of Galveston in East Galveston Bay.

The new strike flowed at the rate of 42 bbl. of 40°-gravity oil daily on 11/64-in. choke. Perforations are at 8,048-54 and 8,061-66 ft. Gas-oil ratio is 16,400:1.

This new field is located southeast of Hannah Reef field on State Tract 235.

### SOUTHWEST TEXAS

## Edwards Neared at Webb County Deep Hole

A record-breaking Edwards lime wildcat in Webb County is now the deepest hole in the county. Ginther, Warren & Ginther's Pescadito prospect, 14 miles east of Laredo in Section 1806, GC&SF Survey, was drilling at 13,909 ft. on June 4. The Edwards is expected at about 14,000 ft.

This well has found some gas shows in shallow zones, but the operator has taken no tests. Tops reported are: Austin chalk, 12,500 ft.; Buda lime, 12,906 ft.; Del Rio clay, 13,026 ft.; and Georgetown, 13,200 ft.

## *Successful Wildcats*

### CALIFORNIA

Glenn County: Doheny-Natural Gas 1 Vestner, NW SE 15-20n-2w, 5,000 M.c.f. daily, ¾-in. choke, perfs. 5,038-5,020 ft. and 5,044-66 ft., TD 8,000 ft. (New gas pool discovery 2 miles east of Willows field production.)

Tehama County: Buttes Gas & Oil Co. A-2 Saldubehere SE SE 25-24n-3w, 2,000 M.c.f. daily, ½-in. choke, perfs. 1,182-1,205 ft, TD 1,228 ft. (Shallow gas sand discovery in South Dome gas field.)

### MONTANA

Sheridan County: Amerada 1 Ruegsegger, NE NE 24-36n-52e. IPF 293 BOPD, 157 BWPD, Silurian discovery, new field. TD 10,030 ft. Winnipeg.

### NEBRASKA

Garden County: J. M. Huber Corp. 1 Olsen, C NW SE 11-16n-44w. IPF 3,500 M.c.f. of gas per day, "D" sand discovery, new field. TD 3,306 ft. Skull Creek.

Kimball County: Skelly Oil Co. 1 Rodman, NE SW SE 8-15n-55w. IPP 184 BOPD, "J" sand discovery, new field. TD 6,397 ft. "J" sand.

### PENNSYLVANIA

Indiana County, Armstrong Township: New York State Natural Gas Corp. N-536 William George 1,517,000 cu. ft. gas after fracture. Chert 7,579 ft., Oriskany sand 7,706-32 ft., gas in both formations. TD 7,736 ft.

(Continued on page 261)


**Mighty EQUITY Tug**

**THE 105′ KINGS POINT**

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### *3 years with a new chief and . . .*

## . . . Blackwell Makes a Comeback

THREE YEARS ago, Blackwell Oil & Gas Co. was in bad shape. In 2 years production had slipped from 1,300 bbl. daily to about 850 bbl. in 1954. The company lost $107,000 that year.

That's when Paul Schultz took over as president of one of Oklahoma's oldest oil firms.

Since then, production has nearly doubled. Blackwell now nets 1,500 bbl. daily. The company has stepped into secondary recovery in a big way, and two more water floods are in the mill today. Another drive is under way to find new reserves.

The real proof that Blackwell is heading in the right direction showed up in the company's annual report last year. Profits soared to $213,000 in 1956.

It's the story of an old company with new ideas. And behind the story is mild-mannered, fast-moving Paul Schultz who at 41 knows a lot about a lot of things and isn't afraid to speak up.

**The independent . . .** Schultz knows the independent operator. As the second president of the fledgling Oklahoma Independent Petroleum Association, he is carrying the views of the Oklahoma independent to both the state and the national capitols.

He knows what the independents in Oklahoma want by way of holding down imports, natural-gas legislation, and a more equitable allocation formula for Oklahoma.

He also knows how the large integrated companies operate, because he spent 15 years in the Standard Oil Co. (Ind.) organization.

Three days after young Schultz graduated with a master's degree in chemical engineering in 1939, he was hired by Indiana Standard at Whiting where he worked with the economics of plant operations.

Three years later, Schultz moved from research to the executive manufacturing department in Chicago as a technical advisor.

The next step was appointment as chief chemical engineer for Stanolind Oil & Gas Co. in Tulsa in 1946. During the next 8 years he moved successively to manager of the economics department, assistant to the executive vice president, and manager of chemical operations.

That was his experience when he resigned to accept the role as reorganizer of the ailing Blackwell Oil & Gas Co. in Cushing, Okla.

**Secondary recovery . . .** One of the first things Schultz did was move Blackwell to Tulsa where he could be close to where deals are made. Then he concentrated on cutting costs and increasing production.

The road to Blackwell's recovery lead to secondary recovery. In 1954 Blackwell's production was only 15 per cent secondary recovery. Today it is 50 per cent.

Two new floods are in the hopper. As operator of Happy Valley unit south of Cushing, Blackwell is installing equipment and will flood the Bartlesville sand under 700 acres this summer.

An even bigger flood is planned for two Strawn sands in Hull-Silk field of North Texas. The pool, which has already produced 23,000,000 bbl. of primary oil, covers 2,000 acres.

Although Blackwell has concentrated on secondary recovery the past 3 years, the company will become more and more active in the search for new reserves to supplement production in Oklahoma, Texas, Arkansas, and North Louisiana.

Schultz says there's still plenty of oil to be found, and he feels that Oklahoma has "a brilliant future for deep production."

Unlike many independent companies in the Mid-Continent area, Blackwell's drilling operations are not down so far this year. In fact, the number of Blackwell completions is up slightly over the same period last year.

Schultz thinks drilling will increase throughout the nation during the second half of the year. His confidence is not confined to the oil industry. America is in for much greater prosperity, he says "and we're making our plans on the basis of a continued uptrend."

**Roger Wiley** has joined Kirpatrick & McGuire, Shreveport, La., oil operators, as chief geologist. He was formerly geologist with Union Producing Co.

**George L. Buckles,** partner in the consulting firm of Buckles & Hostetler, has formed George L. Buckles Co., production consultant firm in Monahans, Tex. A graduate of the University of Oklahoma, Buckles was with Pure Oil Co. 16 years before joining Forest Oil Corp. in 1948 as superintendent of water floods. He became a consultant in 1951.

**Kenneth E. Worral** has joined Alex W. McCoy Associates, Inc., Tulsa, as a petroleum engineer. Worral was formerly with Pure Oil Co.

BURLINGAME

**Mark V. Burlingame,** executive vice president of Natural Gas Pipeline Co. of America and Texas Illinois Natural Gas Pipeline Co., has been elected president of Peoples Production Co., an affiliate. Burlingame joined Natural Gas Pipeline in 1931 and was vice president of operations before becoming executive vice president. In other changes, **J. G. Dickinson,** Natural Gas Pipeline vice president in charge of production, has been named a director of Peoples Production, and **F. P. Burns,** assistant vice president in charge of production, has been elected a vice president of Peoples Production and Texoma Production Co.

**W. P. G. Maclachlan** has been named general manager of the British-owned Assam Oil Co., Ltd. He succeeds **D. C. Robertson,** who has retired after 29 years with the company.

**Raymond S. Gibson** has been promoted to senior process engineer at Vickers Petroleum Co.'s Potwin, Kans., refinery. Gibson has been with Vickers since 1951.

**M. J. Cary,** general operations foreman at Texas-U. S. Chemical Co.'s Port Neches, Tex., plant, has been promoted to assistant production superintendent. **R. M. Grey** will succeed Cary as general operations foreman. Grey has been on special assignments at the plant. Both have been with Texas-U. S. since it was formed in 1955.

**James T. Grady, Jr.** has been promoted by The Texas Co. from Illinois district superintendent to assistant general superintendent of drilling and production and transferred from Salem, Ill., to Tulsa. **Ross M. Archer,** assistant Oklahoma district superintendent, will succeed Grady in Salem as district superintendent. Archer's transfer has set off several other changes in Texaco's Oklahoma district. He will be succeeded by **Herbert L. Murray,** Kansas district assistant superintendent. Murray will headquarter in Tulsa. **Gene R. Bates,** field foreman in Maysville, Okla., will transfer to Wichita to replace Murray. **John E. McDonald,** production foreman in Healdton, Okla., has been appointed field foreman in Maysville. McDonald is succeeded in Healdton by **George E. Krouse,** production foreman in Seminole, Okla., and **Lloyd G. Austin**, petroleum engineer in Salem, has been transferred to Seminole as production foreman.

**O. H. Spittler** has been named chief laboratory supervisor at the Corpus Christi refinery of Delhi - Taylor Oil Corp.

**J. W. (Win) Miller** has been named assistant to the president of Union Oil Co. He will headquarter in San Francisco. Miller was formerly vice president of Brea Chemicals, Inc., a Union subsidiary.

**Fred W. Macfarline** has joined Vickers Petroleum Co., Inc., as chief refinery engineer at its Potwin, Kans., refinery. Macfarline was formerly maintenance supervisor for Great Northern Oil Co. and was also with Deep Rock Oil Co. at one time.

**O. G. Simpson,** district superintendent in Oklahoma City for Sinclair Oil & Gas Co., has been transferred to Tulsa as executive assistant in the production department to **F. H. Rhees,** vice president. He succeeds **D. T. Fenwick,** recently transferred to Denver as assistant division manager. Simpson has been with Sinclair since 1949 and has been Oklahoma City district superintendent since 1956. **Ollie W. White, Jr.,** assistant district superintendent in Oklahoma City, moves up to succeed Simpson as superintendent. **Harley V. Ashley,** district foreman at Drumright, Okla., has been transferred to Oklahoma City as assistant district superintendent, and **Cecil B. York,** assistant district foreman at Lindsay, Okla., will succeed Ashley at Drumright.

## Personals

**B. L. Goepfert,** mechanical engineer with Shell Oil Co., has been transferred to Los Angeles from Houston.

BERT C. TIMM

**Bert C. Timm,** Oklahoma division geologist for Sunray Mid-Continent Oil Co., has been named chief geologist of the company. Timm joined Sunray in 1950 as district geologist in southern Louisiana. He became division geologist in 1952. **Thomas A. Clote** moves up from West Texas-Southeast New Mexico division geologist to succeed Timm in the Oklahoma division. **Walter J. Slagle,** district geologist in Oklahoma City, has been named to replace Clote. He will headquarter in Tulsa. **Russell J. Ford** has been appointed district geologist in Oklahoma City succeeding Slagle. Ford has been senior geologist and geophysical-geological coordinator in Oklahoma City.

**Earl G. Ellerbrake,** group supervisor of planning in the engineering section of Sohio Pipe Line Co.'s transportation department, has been given a year's leave of absence on assignment with the Office of Oil and Gas as industrial specialist in petroleum transportation.

### Petroleum Electric Power Association Elects

**J. F. Maddox, center, president of New Mexico Electric Service Co., was elected president of Petroleum Electric Power Association at the recent P.E.P.A. annual conference in Amarillo, Tex. Maddox succeeds F. R. Woerner, left, of Texas Electric Service Co. Harvey Cherry, right, Houston Light & Power Co., is vice president. D. S. Coffman, Texas Power & Light Co., new secretary-treasurer, is not pictured.**

## Personals

H. W. FISHER

**H. W. Fisher,** of Standard Oil Co. (N. J.), will become an executive director of Iraq Petroleum Co., Ltd., and affiliated companies on June 30 with the title of joint managing director. The post will be the highest ever held by an American in I.P.C., in which British, Dutch, and French companies have controlling interest. Fisher will relinquish his current posts with Jersey Standard, where he is shareholders' representative in the United Kingdom and chairman of the coordination committee for Europe. In the past he has been coordinator of Jersey's worldwide refinery operations, a director of Esso Standard Oil Co., and president of Enjay Co., Inc. **G. H. Herridge,** an executive director of I.P.C., who has been with the group since the days of the earlier Turkish Petroleum Co., will become managing director of the group's companies. The appointments will become effective after the retirement of **Sir Stephen Gibson** on June 30 as managing director.

**Harry Watson** has been elected president of New Richfield Petroleums, Ltd., of Calgary. His election followed New Richfield's purchase of a controlling interest in Albedena Oils, Ltd..

**Grover E. Ledlie, Jr.,** Denver consultant, has joined Falcon Seaboard Drilling Co. as administrative assistant to the president, in charge of exploration. Ledlie was with Phillips Petroleum Co., Globe Refining Co., and Lario Oil & Gas Co., before becoming a consultant.

**J. P. Jones,** Bradford, Pa., independent, has been elected president of the Pennsylvania Grade Crude Oil Association. He will continue as the association's director of production. He succeeds the late C. A. Chipman. **Glenn E. Scott,** vice president of Wolf's Head Oil Refining Co., Oil City, Pa., was elected assistant treasurer of the association. All other officers were re-elected. Six new directors were named. They are **F. O. Koontz,** president, Quaker State Oil Refining Corp.; **C. G. Johnson,** treasurer, Quaker State; **John E. Selden,** executive vice president, South Penn Oil Co.; **S. M. Vockel, Jr.,** Waverly Oil Works Co.; Jones and Scott.

**O. C. McBryde, Jr.,** district engineer with Amerada Petroleum Corp., has been transferred to Fairbanks, Tex., from Midland.

**John L. Severson** has been promoted to district exploration superintendent for Pan American Petroleum Corp. in Bismarck, N. D. He was formerly district geologist in Denver.

**Mario K. Polak** has been elected president and general manager of Damar Systems, Ltd., of Calgary. Polak was formerly with English Drilling Equipment Co. in London and with Calgary Steel Tank, Ltd.

**L. F. McCollum,** Continental Oil Co. president, has received the United Shareholders of America annual meeting award. The award recognizes achievement in maintaining good stockholder-management relations within his company. It was presented to McCollum by the group's advisory committee on awards. Committee members are financial writers from leading New York newspapers.

**R. E. Beeker,** Republic Natural Gas Co., has been elected president of the Corpus Christi Geological Society. Other officers are **J. E. Ramsey,** Schlumberger Well Surveying Corp., first vice president; **R. B. Morton,** Sunray Mid-Continent Oil Co., second vice president; **R. C. Wilshusen,** Core Laboratories, Inc., treasurer and **Francis R. Clarkson,** independent, secretary. **Dale Benson,** Sinclair Oil & Gas Co., and **C. C. Miller,** Renwar Oil Corp., have been elected councilors.

W. M. ELMER

**W. M. Elmer** has been elected president of Texas Gas Transmission Corp. succeeding the late W. T. Stevenson. Elmer joined Texas Gas in 1947. He was senior vice president before being elected executive vice president earlier this year. He has been president and a director of Texas Gas Exploration Corp. since 1953.

**C. E. Hobley,** manager of operations in Shell Oil Co.'s head office exploration department, has been assigned to Shell Petroleum Co., Ltd., in London. Hobley joined the Royal Dutch-Shell group in 1930. He was chief of the geological department at The Hague before coming to New York in 1953 as assistant to the vice president in charge of exploration and production.

**B. R. Norman,** district production foreman for Sinclair Oil & Gas Co. in Oklahoma City, has been transferred to Fort St. John, British Columbia, as assistant district superintendent.

**R. E. Howe** has been named manager of planning and **E. W. Griscom,** manager of operations in Sinclair Re-

E. W. GRISCOM

G. A. BLAINE

fining Co.'s manufacturing department. Both will have headquarters in New York. Howe was manager of processing and before that manager of the company's Sinclair, Wyo., refinery prior to his recent assignment. Griscom has been manager of Sinclair's East Chicago, Ind., refinery since 1954. **George A. Blaine,** assistant manager at the East Chicago refinery, will succeed Griscom as manager.

**George E. Tillquist** has been transferred from Sinclair Research Laboratories in Harvey, Ill., to Sinclair Chemicals, Inc., in New York City where he will be process engineer.

**Richard Robert Anderson** has been named administrative assistant in Sun Oil Co.'s production department. He will transfer to the company's general offices in Philadelphia from Lafayette, La., where he was assistant regional superintendent of the Gulf Coast division. He succeeds **Ted C. Stauffer,** recently named director of Sun's foreign production operations.

## DEATHS

**B. M. (Cap) Smith,** 44, executive vice president of Leland Equipment Co., died June 13 in Tulsa after a heart attack.

**Paul B. Wittman,** Houston independent oil operator, died in a Houston hospital June 12. Wittman, 48, was the son-in-law of Olin Culberson, chairman of the Texas Railroad Commission.

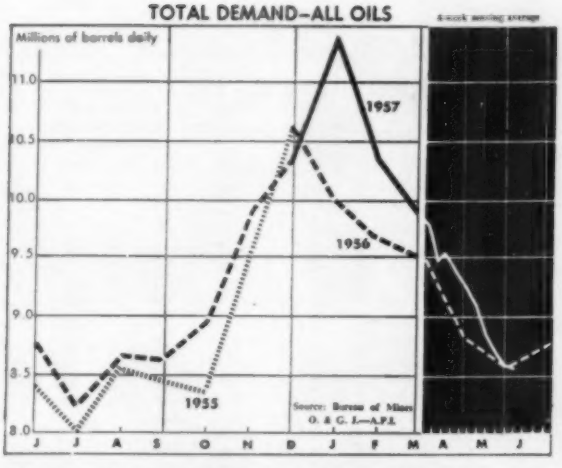
**William E. Cox,** 45, geologist with Humble Oil & Refining Co. in Midland, Tex., died June 9 in Midland.

**John S. Fabriguze,** 63, former Houston independent oil operator, died in a Houston hospital June 9 after an extended illness.

# Latest Figures . . . Industry Trends

## A QUICK LOOK AT THE HIGHLIGHTS

| | LATEST WEEK | Change from WEEK AGO | | Change from YEAR AGO | |
|---|---|---|---|---|---|
| Production | 7,348,025 | DOWN | 70,150 | UP | 295,608 |
| Crude stocks | 269,124,000 | UP | 3,663,000 | DOWN | 6,569,000 |
| Completions | 911 | DOWN | 10 | DOWN | 246 |
| Refinery runs | 8,080,000 | DOWN | 52,000 | UP | 51,000 |
| Gasoline stocks | 193,565,000 | DOWN | 1,720,000 | UP | 9,156,000 |
| Kerosine stocks | 26,263,000 | UP | 1,243,000 | UP | 3,360,000 |
| Distillate stocks | 101,789,000 | UP | 4,770,000 | UP | 21,152,000 |
| Residual stocks | 41,246,000 | UP | 1,179,000 | UP | 4,504,000 |
| Four-product stocks | 362,863,000 | UP | 5,472,000 | UP | 39,172,000 |
| Total imports | 1,482,600 | DOWN | 109,400 | UP | 40,500 |




## Residual Fuel May Be Overpriced; It's Showing Up in Domestic Demand

HEAVY-FUEL markets may be under more pressure before the summer is over. Demand for residual was high enough in 1955 and 1956 to create stable markets at good prices. But, extra demand during the Suez crisis boosted prices above the point where users start shifting to other fuels.

On the Gulf Coast, Bunker C prices ranged from a little under $2.00 a barrel to $2.10 a barrel in 1955. The price remained at $2.10 in 1956 up to the time of the fuel scramble caused by the closing of Suez. By the end of 1956, posted prices were up to $2.75-$2.90 with reports of premiums for immediate lifting.

In the Mid-Continent, the basis for spot prices shifted from what buyers would pay for northern shipment to what the fuel would bring on the Gulf Coast.

Refiners on the Gulf Coast and in the Group 3 area may have priced themselves out of the boiler-fuel market. Last winter's weather can be credited with an assist.

Under normal conditions, winter demand in the North Central states takes all of the surplus residual from the Mid-Continent. If the weather is abnormally cold, there may be a shortage of dirty tank cars to move the material.

Many electric-utility plants in the fringe area between the Mid-Continent and North Central districts use natural gas as fuel during the summer months. They change to residual in very cold weather when the gas is discontinued under interruptible contracts. There was very little shifting to heavy fuel last winter.

Because of the warm weather, more gas was available for utility and other industrial plants. Also, the prices Mid-Continent refiners were receiving for material shipped to the Gulf Coast were too high for normal industrial users.

Some refiners have been counting on asphalt sales to take a large per cent of the surplus heavy material this summer. So far the movement has been disappointing. The national road program is running behind schedule, and wet weather has slowed down repair work using asphalt and road oils.

Since the asphalt season is limited and since very little work was done in April and May, total asphalt use may be lower than expected. Actual sales for the first quarter dropped below the first quarter of last year.

Domestic demand for residual fuel for the first 5 months of this year dropped below the average for the same period in 1956. Even total demand for resid in March was less than the year before.

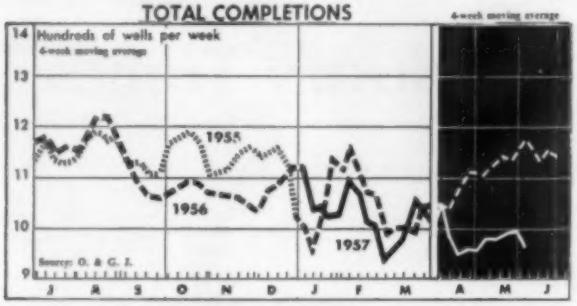
If stocks keep moving up, refiners will be out selling in competition with other fuels. That's when the price question will have to be answered.

For many years, the rule-of-thumb test of residual prices was 60 per cent of the average price of crude. On this basis, the Group 3 price is high. Mid-Continent crude averages between $3.05 and $3.10 a barrel. Sixty per cent of $3.10 would be $1.86 a barrel.

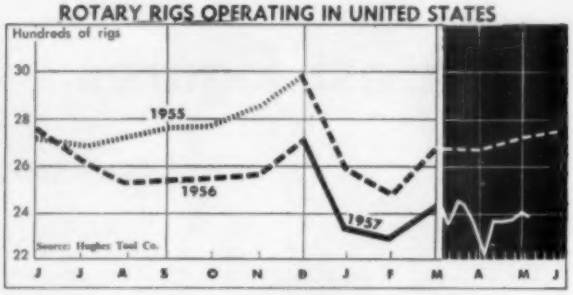
Most refiners in Group 3 carry a formal quotation of $2.25 a barrel, but some material probably could be found for $2.10. The price may have to go below the $1.86 to regain old markets.

If prices go below $1.50, some refiners will return to coking. But, they don't need the extra distillate at this time.

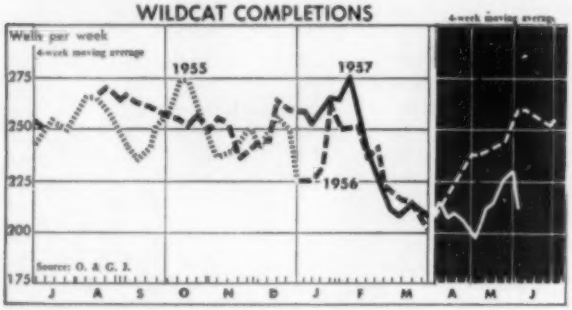
TOTAL COMPLETIONS




ROTARY RIGS OPERATING IN UNITED STATES




WILDCAT COMPLETIONS




ACTIVE ROTARY RIGS*

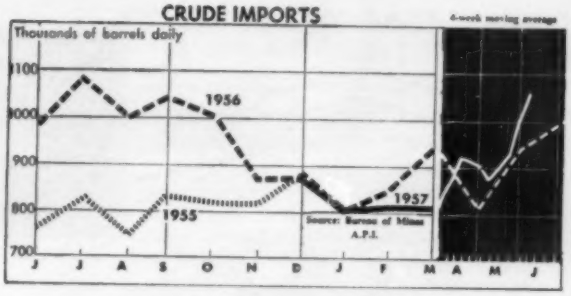
| Area— | 6-10-57 | 6-3-57 | 6-11-56 |
|---|---|---|---|
| North Central and East | 105 | 80 | 134 |
| Southeast | 48 | 43 | 29 |
| Okla., Kans., Ark., Mo. | 399 | 406 | 497 |
| Louisiana | 430 | 438 | 451 |
| North and East Texas-Panhandle | 352 | 378 | 435 |
| Gulf and South Texas | 203 | 195 | 240 |
| West Texas-New Mexico | 511 | 514 | 568 |
| Rocky Mountain | 253 | 259 | 274 |
| Pacific Coast | 97 | 98 | 127 |
| Total United States | 2,398 | 2,411 | 2,755 |
| Canada | 235 | 223 | 248 |

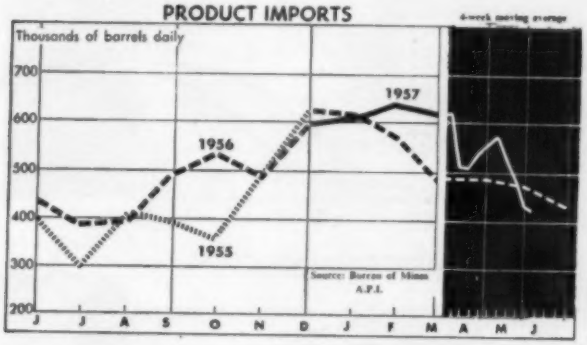
*Hughes Tool Co.

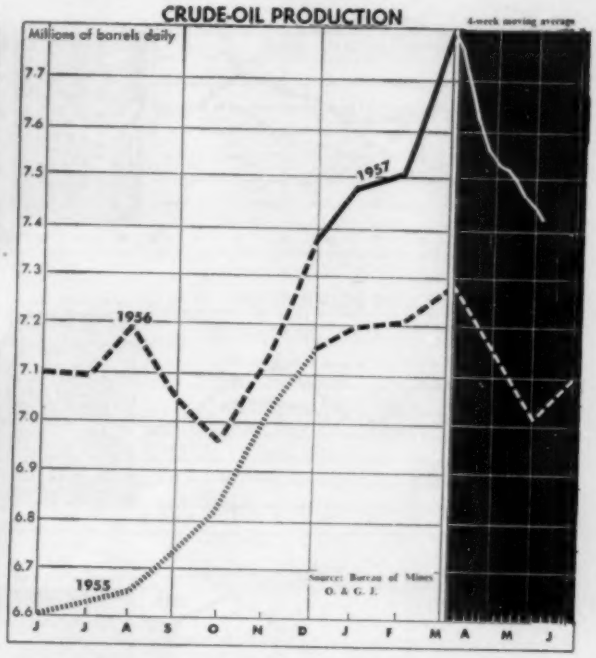
## WEEKLY WELL COMPLETIONS . . . WEEK ENDED JUNE 8, 1957

| | Total of all wells | | | | | | | Wildcat completions and discoveries | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Cum. | | | | | | | Cumulative total, 1957 | | | | |
| | Comp. | Oil | Gas | Dry | Footage | 1957 | 1956 | Oil | Dist. | Gas | Dry | Total | Oil | Dist. | Gas | Dry | Total |
| Ala.-Ga.-Fla. | †2 | 2 | 0 | 0 | 22,528 | 51 | 44 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 18 | 19 |
| Arkansas | 16 | 11 | 0 | 5 | 49,210 | 409 | 337 | 1 | 0 | 0 | 1 | 2 | 10 | 0 | 3 | 54 | 67 |
| California | 63 | 41 | 2 | 20 | 259,822 | 961 | 966 | 0 | 0 | 2 | 15 | 17 | 27 | 0 | 4 | 208 | 239 |
| Colorado | 7 | 0 | 0 | 7 | 35,054 | 371 | 514 | 0 | 0 | 0 | 5 | 5 | 13 | 0 | 9 | 227 | 249 |
| Illinois | 40 | 12 | 2 | 26 | 88,497 | 1,050 | 1,568 | 0 | 0 | 0 | 8 | 8 | 12 | 0 | 1 | 243 | 256 |
| Indiana | 11 | 2 | 1 | 8 | 17,632 | 277 | 271 | 0 | 0 | 0 | 1 | 1 | 5 | 0 | 0 | 50 | 55 |
| Kansas | 81 | 38 | 4 | ‡39 | 287,044 | 1,793 | 2,239 | 2 | 0 | 0 | 13 | 15 | 48 | 0 | 11 | 290 | 349 |
| Kentucky | 18 | 8 | 0 | 10 | 19,014 | 601 | 716 | 0 | 0 | 0 | 0 | 0 | 13 | 0 | 4 | 97 | 114 |
| Louisiana | 74 | 37 | 7 | 30 | 673,823 | 1,630 | 1,679 | 2 | 0 | 4 | 11 | 17 | 37 | 9 | 44 | 201 | 291 |
| North | 15 | 4 | 1 | 10 | 68,340 | 541 | 653 | 0 | 0 | 1 | 6 | 7 | 6 | 0 | 5 | 55 | 66 |
| South | 45 | 28 | 5 | 12 | 481,522 | 775 | 820 | 2 | 0 | 2 | 4 | 8 | 22 | 8 | 32 | 123 | 185 |
| Offshore | 14 | 5 | 1 | 8 | 123,961 | 314 | 206 | 0 | 0 | 1 | 1 | 2 | 9 | 1 | 7 | 23 | 40 |
| Michigan | 5 | 3 | 0 | 2 | 18,753 | 171 | 193 | 0 | 0 | 0 | 1 | 1 | 6 | 0 | 0 | 63 | 69 |
| Mississippi | 5 | 2 | 0 | 3 | 37,296 | 160 | 195 | 0 | 1 | 0 | 3 | 4 | 10 | 1 | 0 | 68 | 79 |
| Montana | 5 | 2 | 0 | 3 | 20,794 | 146 | 144 | 0 | 0 | 0 | 1 | 1 | 4 | 0 | 0 | 47 | 51 |
| Nebraska | 9 | 4 | 0 | 5 | 55,035 | 345 | 428 | 1 | 0 | 0 | 4 | 5 | 18 | 0 | 0 | 176 | 194 |
| New Mexico | 47 | 27 | 15 | 5 | 219,603 | 875 | 813 | 1 | 0 | 0 | 4 | 5 | 30 | 1 | 6 | 85 | 122 |
| Northwest | 21 | 5 | 14 | 2 | 81,794 | 330 | 314 | 1 | 0 | 0 | 2 | 3 | 13 | 1 | 5 | 27 | 46 |
| Southeast | 26 | 22 | 1 | 3 | 137,809 | 545 | 499 | 0 | 0 | 0 | 2 | 2 | 17 | 0 | 1 | 58 | 76 |
| New York | 9 | 4 | 0 | §5 | 9,250 | 204 | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 |
| North Dakota | 4 | 1 | 0 | 3 | 20,940 | 122 | 103 | 0 | 0 | 0 | 3 | 3 | 5 | 0 | 0 | 44 | 49 |
| Ohio | 17 | 11 | 2 | ¶4 | 43,603 | 445 | 459 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 3 |
| Oklahoma | 91 | 51 | 1 | §38 | 332,069 | 2,756 | 3,894 | 2 | 0 | 0 | 2 | 4 | 44 | 9 | 8 | 255 | 316 |
| Pennsylvania | 17 | 0 | 12 | 5 | 124,635 | 354 | *423 | 0 | 0 | 1 | 1 | 2 | 0 | 0 | 15 | 20 | 35 |
| Texas | 369 | 234 | 13 | 122 | 1,553,811 | 9,517 | 9,676 | 3 | 1 | 0 | 69 | 73 | 276 | 35 | 92 | 2,041 | 2,444 |
| Southwest (1 & 4) | 49 | 27 | 2 | 20 | 196,401 | 1,176 | 1,403 | 0 | 0 | 0 | 8 | 8 | 38 | 12 | 26 | 343 | 419 |
| Gulf Coast (2 & 3) | 41 | 23 | 3 | 15 | 340,575 | 1,090 | 1,196 | 0 | 0 | 0 | 10 | 10 | 19 | 16 | 42 | 292 | 369 |
| East (5 & 6) | 36 | 18 | 0 | 18 | 86,633 | 545 | 491 | 0 | 1 | 0 | 16 | 17 | 4 | 1 | 2 | 161 | 168 |
| N. Central (7-B & 9) | 120 | 59 | 2 | 59 | 388,512 | 3,435 | 3,508 | 2 | 0 | 0 | 30 | 32 | 148 | 0 | 12 | 883 | 1,043 |
| West (7-C & 8) | 95 | 87 | 0 | 8 | 442,607 | 2,675 | 2,521 | 1 | 0 | 0 | 4 | 5 | 62 | 0 | 8 | 334 | 404 |
| Panhandle (10) | 28 | 20 | 6 | 2 | 99,083 | 596 | 557 | 0 | 0 | 0 | 1 | 1 | 5 | 6 | 2 | 28 | 41 |
| Utah | 0 | 0 | 0 | 0 | 0 | 73 | 38 | 0 | 0 | 0 | 0 | 0 | 6 | 0 | 3 | 33 | 42 |
| West Virginia | 13 | 1 | 9 | 3 | 37,113 | 264 | 291 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 7 | 4 | 11 |
| Wyoming | 7 | 4 | 0 | 3 | 35,753 | 347 | 331 | 0 | 0 | 0 | 1 | 1 | 13 | 0 | 3 | 100 | 116 |
| Miscellaneous (Wash.) | 1 | 0 | 0 | 1 | 6,001 | 30 | 57 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 1 | 24 | 25 |
| Total United States | **911** | 496 | 68 | 347 | 3,967,280 | 22,952 | 25,379 | 12 | 2 | 7 | 144 | **165** | 577 | 55 | 213 | 4,351 | 5,196 |
| Total previous week | 921 | 478 | 77 | 366 | 3,992,052 | | | 25 | 3 | 11 | 173 | 212 | 565 | 53 | 206 | 4,207 | 5,031 |
| Total June 9, 1956 | 1,157 | 627 | 67 | 463 | 4,570,111 | | | 36 | 3 | 7 | 219 | 265 | 685 | 66 | 175 | 4,611 | 5,537 |
| Cum. 1957 | 22,952 | 12,294 | 1,660 | 8,998 | 95,456,321 | | | | | | | | | | | | |
| Western Canada | 76 | 51 | 4 | 21 | 339,201 | 1,120 | 1,028 | 1 | 0 | 2 | 18 | 21 | 27 | 0 | 24 | 252 | 303 |

*Incl. N. Y. †Ala. Service wells included: ‡1, §5, ¶3.



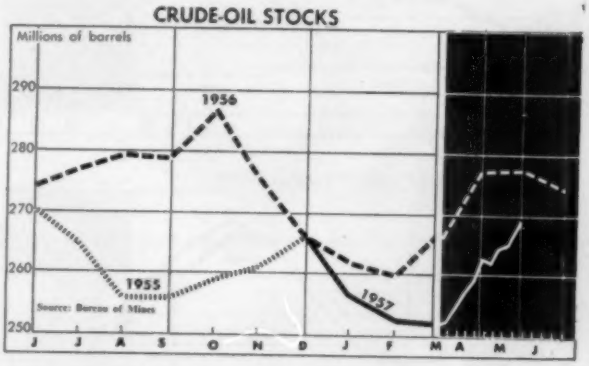




## DAILY AVERAGE PRODUCTION FOR WEEK

| | June 8, 1957 | | | June 1 |
|---|---|---|---|---|
| | Crude oil | Lease condensate | Total | total |
| Alabama | 12,000 | ... | 12,000 | 11,900 |
| Arkansas | 85,350 | 350 | 85,700 | 85,300 |
| California | 927,200 | ... | 927,200 | 928,300 |
| Colorado | 152,000 | ... | 152,000 | 155,200 |
| Eastern | 51,000 | ... | 51,000 | 51,400 |
| Florida | 1,275 | ... | 1,275 | 1,250 |
| Illinois | 227,500 | ... | 227,500 | 222,800 |
| Indiana | 31,900 | ... | 31,900 | 31,900 |
| Kansas | †344,300 | ... | †344,300 | †331,500 |
| Kentucky | 47,100 | ... | 47,100 | 47,500 |
| Louisiana | 805,600 | 75,700 | 881,300 | 926,100 |
| North | 130,600 | 3,200 | 133,800 | 133,600 |
| South | 675,000 | 72,500 | 747,500 | 792,500 |
| Michigan | 28,200 | ... | 28,200 | 28,100 |
| Mississippi | 110,600 | 4,500 | 115,100 | 115,025 |
| Montana | 73,800 | ... | 73,800 | 71,450 |
| Nebraska | 49,850 | ... | 49,850 | 52,000 |
| Nevada | 100 | ... | 100 | 100 |
| New Mexico | 257,500 | 4,500 | 262,000 | 269,150 |
| North Dakota | 39,000 | ... | 39,000 | 37,750 |
| Oklahoma | †598,000 | ... | †598,000 | †588,300 |
| Texas | 3,051,500 | 53,500 | 3,105,000 | 3,160,800 |
| Dist. 1 | 53,500 | 450 | 53,950 | 57,450 |
| Dist. 2 | 144,000 | 8,350 | 152,350 | 156,350 |
| Dist. 3 | 435,000 | 26,200 | 461,200 | 466,300 |
| Dist. 4 | 229,000 | 6,100 | 235,100 | 237,300 |
| Dist. 5 | 40,000 | 300 | 40,300 | 40,400 |
| Dist. 6 | 135,000 | 6,400 | 141,400 | 142,000 |
| East Texas Field | 200,000 | ... | 200,000 | 205,000 |
| Dist. 7-B | 167,000 | 75 | 167,075 | 167,075 |
| Dist. 7-C | 163,000 | 3,600 | 166,600 | 173,800 |
| Dist. 8 | 1,170,000 | 1,100 | 1,171,100 | 1,186,100 |
| Dist. 9 | 213,000 | 600 | 213,600 | 218,700 |
| Dist. 10 | 102,000 | 325 | 102,325 | 110,325 |
| Utah | 8,900 | ... | 8,900 | 8,900 |
| Wyoming | 306,700 | ... | 306,700 | 293,350 |
| Others | ‡100 | ... | ‡100 | ‡100 |
| Total U. S. | 7,209,475 | 138,550 | **7,348,025** | 7,418,175 |
| Change from prev. week, down | | | **70,150** | |
| Canada | †471,200 | ... | †471,200 | †545,550 |
| Total U. S. production—January 1-June 8 | | | 1,204,570,575 bbl. | |
| Same period last year (crude plus cond.) | | | *1,147,694,818 bbl. | |

*Includes 20,397,130 bbl. condensate. †Week ended previous Monday. ‡South Dakota.



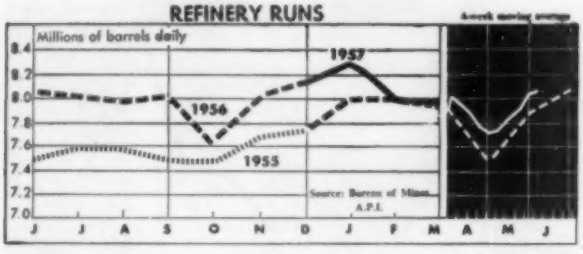

## CRUDE-OIL STOCKS BY STATES OF ORIGIN*

(Thousands of barrels)

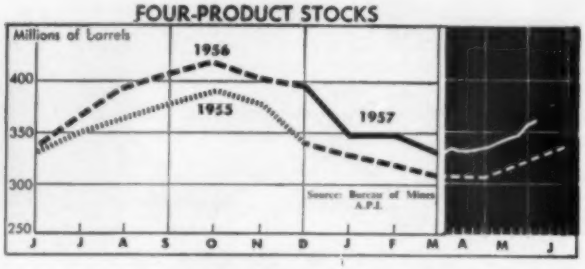
| | 6-1-57 | 5-25-57 | 6-2-56 |
|---|---|---|---|
| Pennsylvania Grade | 2,684 | 2,694 | 2,697 |
| Other Appalachian | 1,909 | 1,923 | 2,236 |
| Illinois, Indiana, Michigan | 9,346 | 9,096 | 10,514 |
| Nebraska, North Dakota | 1,775 | 1,675 | 2,452 |
| Kansas | 10,826 | 11,094 | 8,987 |
| Oklahoma | 22,169 | 21,262 | 27,106 |
| Arkansas | 2,787 | 2,810 | 2,992 |
| Louisiana | 18,889 | 18,851 | 16,225 |
| North | 2,948 | 2,980 | 2,641 |
| South | 15,941 | 15,871 | 13,584 |
| Mississippi | 2,643 | 2,547 | 3,002 |
| New Mexico | 8,093 | 8,304 | 8,111 |
| Texas | 124,260 | 123,335 | 126,435 |
| East Texas proper | 11,831 | 11,720 | 9,222 |
| West Texas | 58,412 | 58,502 | 61,548 |
| Texas Gulf | 23,051 | 23,011 | 23,442 |
| Other Texas | 30,966 | 30,102 | 32,223 |
| Wyoming | 17,044 | 16,832 | 17,985 |
| Other Rocky Mountain | 6,134 | 6,265 | 6,213 |
| California | 26,407 | 25,611 | 28,103 |
| Foreign | †14,158 | 13,162 | 12,725 |
| Total | 269,124 | 265,461 | 275,693 |

*Bureau of Mines. †Includes 2,880,000 bbl. in California.

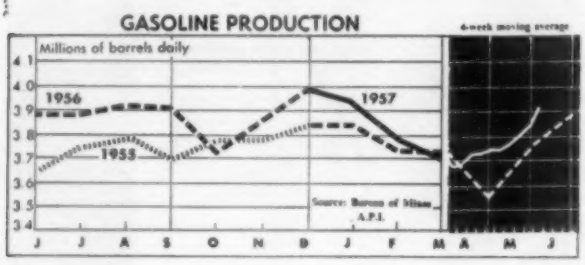
REFINERY RUNS



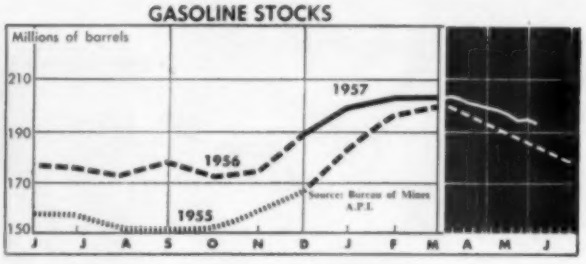

FOUR-PRODUCT STOCKS



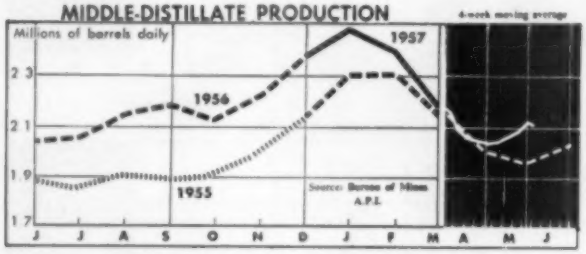

GASOLINE PRODUCTION



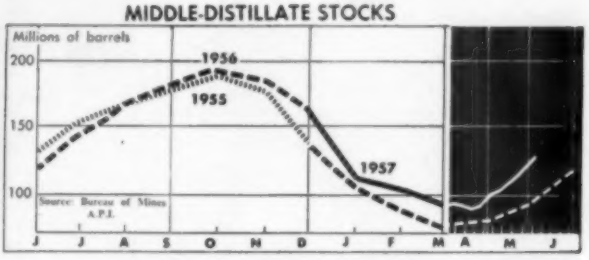

GASOLINE STOCKS



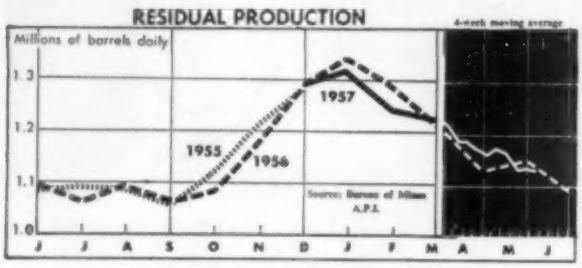

MIDDLE-DISTILLATE PRODUCTION



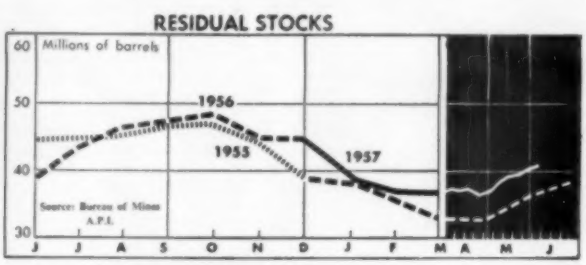

MIDDLE-DISTILLATE STOCKS




RESIDUAL PRODUCTION




RESIDUAL STOCKS




## A.P.I. REFINERY REPORT—JUNE 7, 1957

(Thousands of barrels)

| District— | Daily avg. runs | Daily average production Gaso.* | Kero. | Dist. | Resid. | Stocks‡ Gaso.† | Kero. | Dist. | Resid. | Bureau of Mines, June 1956 Daily avg. runs | Daily average production Gaso.* | Kero. | Dist. | Resid. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| East Coast | 1,205 | 531.8 | 23.7 | 301.2 | 231.9 | 43,451 | 10,624 | 33,398 | 10,419 | 1,149 | 440.0 | 35.3 | 290.5 | 193.1 |
| Appalachian: | | | | | | | | | | | | | | |
| District 1 | 101 | 46.0 | 3.0 | 23.9 | 5.4 | 4,844 | 514 | 2,112 | 484 | 109 | 43.8 | 2.6 | 27.8 | 5.0 |
| District 2 | 102 | 53.4 | 6.4 | 14.0 | 13.0 | 2,632 | 514 | 813 | 303 | 95 | 53.4 | 4.8 | 13.8 | 12.7 |
| Ind., Ill., Ky. | 1,437 | 736.7 | 73.7 | 293.4 | 179.4 | 34,365 | 4,842 | 16,118 | 5,447 | 1,359 | 688.0 | 71.4 | 251.8 | 146.6 |
| Minn., Wis., Dak. | 101 | 49.9 | 9.8 | 27.1 | 9.3 | 6,558 | 694 | 4,348 | 329 | 93 | 45.6 | 7.7 | 25.2 | 6.9 |
| Okla., Kans., Mo. | 679 | 392.6 | 15.6 | 155.4 | 30.0 | 17,661 | 1,370 | 9,019 | 906 | 717 | 399.8 | 14.3 | 169.1 | 30.1 |
| Inland Texas | 279 | 202.9 | 12.4 | 51.6 | 20.7 | 7,060 | 402 | 2,184 | 1,754 | 280 | 207.5 | 6.4 | 51.3 | 22.2 |
| Texas Gulf Coast | 1,962 | 963.8 | 77.0 | 479.9 | 246.7 | 26,193 | 3,320 | 12,295 | 5,340 | 2,040 | 971.5 | 94.1 | 510.7 | 262.9 |
| La. Gulf Coast | 688 | 353.9 | 51.3 | 188.7 | 59.3 | 10,834 | 2,732 | 5,726 | 1,274 | 740 | 373.5 | 38.3 | 182.4 | 49.0 |
| N. La. and Ark. | 84 | 32.9 | 3.9 | 16.4 | 3.9 | 4,257 | 674 | 1,726 | 50 | 99 | 36.1 | 6.7 | 25.1 | 6.4 |
| Rocky Mountain: | | | | | | | | | | | | | | |
| New Mexico | 28 | 14.4 | 0.6 | 5.3 | 3.7 | 354 | 10 | 85 | 66 | 23 | 12.1 | 0.2 | 4.4 | 3.4 |
| Other Rocky Mt. | 281 | 135.4 | 3.1 | 56.1 | 35.3 | 7,394 | 226 | 2,622 | 1,157 | 286 | 135.2 | 4.1 | 63.3 | 33.1 |
| California | 1,133 | 481.7 | 5.6 | 167.0 | 353.0 | 27,416 | 341 | 11,343 | 13,717 | 1,081 | 473.2 | 4.2 | 139.3 | 327.0 |
| June 7, 1957 | 8,080 | 3,995.1 | 286.1 | 1,780.0 | 1,191.6 | 193,565 | 26,263 | 101,789 | 41,246 | 8,071 | 3,879.7 | 290.1 | 1,754.7 | 1,098.4 |
| May 31, 1957 | 8,132 | 3,925.1 | 302.7 | 1,865.0 | 1,143.3 | 195,285 | 25,020 | 97,019 | 40,067 | ..... | ..... | ..... | ..... | ..... |
| June 8, 1956 | 8,029 | 3,877.4 | 305.7 | 1,727.4 | 1,148.7 | 184,409 | 22,903 | 80,637 | 36,742 | ..... | ..... | ..... | ..... | ..... |

*At refineries including natural blended. †Finished and unfinished. ‡At refineries, bulk terminals, in transit, and in pipelines.

# Crude-Oil and Refinery Prices at Representative U. S. and Foreign Points

## REFINED-PRODUCT PRICES

Following quotations are for refinery products in cents per gallon moving in interstate shipments on Wednesday each week unless otherwise noted. Crude-oil prices are per barrel at the wells unless otherwise listed.

### GASOLINE*

| | |
|---|---|
| **Mid-Continent (Group 3):** | |
| ★ Regular (89 octane) | 11.75-12.25 |
| ★ Premium (98 octane) | 14.50-15.00 |
| **Gulf Coast (cargoes for coastwise or export movements):** | |
| Regular (90 octane) | 10.50-11.25 |
| Regular (92 octane) | 10.75-11.50 |
| Premium (97 octane) | 12.50-13.25 |
| Premium (98 octane) | 12.75-13.50 |
| **California (rack):** | |
| Regular (88 octane) | 13.1 |
| Premium (96 octane) | 15.8 |
| Premium (98 octane) | 16.2 |
| **Caribbean area (cargoes):** | |
| Regular (87 octane) | 10.875 |
| Premium (93 octane) | 11.75 |

*Quotations are for octanes shown. Prices usually vary with octane ratings within the regular, premium, and aviation grades.

### NATURAL GASOLINE*

| | |
|---|---|
| **Group 3:** | |
| Grade 26-70 | 4.0 |
| **Breckenridge:** | |
| Grade 26-70 | 3.5 |

*If 26-70 natural is considered as 100 per cent, prices for lower-vapor-pressure grades increase 2.5 per cent for each unit drop in Reid vapor pressure down to and including 16 lb. Prices for grades below 16 lb. may vary slightly by areas or plants.

### KEROSINE AND DISTILLATE

| | |
|---|---|
| **Mid-Continent (Group 3):** | |
| ★ Kerosine 42-44 | 9.75-10.25 |
| ★ Diesel oil (58 d.i. and above) | 9.375-9.75 |
| ★ Distillate No. 1 | 9.375-9.75 |
| ★ Distillate No. 2 | 8.75-9.125 |
| **Gulf Coast (cargoes):** | |
| Kerosine 41-43 | 9.625-10.50 |
| Distillate No. 2 | 9.50-10.00 |
| **New York Harbor (barges):** | |
| Kerosine 41-43 | 11.75 |
| Distillate No. 2 | 11.15 |
| Diesel fuel, 48-52 d.i. | 11.45 |
| **Caribbean area (cargoes):** | |
| ★ Distillate No. 2 | 9.50-10.00 |

### WAX (LB.)

| | |
|---|---|
| **Oklahoma (Group 3):** | |
| 132-135 A.m.p. (semi-refined) in tank cars | 6.50 |
| **New York (export):** | |
| 126-130 A.m.p. crude scale (solid in bags or barrels) | 7.35 |

★Denotes change from previous week.

### RESIDUAL FUEL (BBL.)

| | |
|---|---|
| **Mid-Continent (Group 3):** | |
| ★ Residual fuel (max. 1% S) | $2.15-2.35 |
| **Gulf Coast (cargoes):** | |
| Bunker C fuel | $2.75-3.00 |
| **New York Harbor (barges):** | |
| Bunker C fuel | $3.10 |
| **Caribbean (cargoes):** | |
| Bunker C | $2.55 |
| **California (rack):** | |
| Bunker C fuel, Los Angeles | $2.85-3.00 |

### LUBRICATING OILS

| | |
|---|---|
| **Mid-Continent (Group 3):** | |
| 150-160 bright stock, solvent refined, 0-10 p.p., v.i. | 25.5 |
| 200 vis. neutral oil, solvent refined, 0-10 p.p., 95 v.i. | 22.25 |
| **Pennsylvania Grade:** | |
| 145-155 vis. at 210, bright stock, 8 color, 25 p.t. | 28 |
| 200 vis. neutral (180 at 100°), 25 p.t. | 26 |

## CRUDE-OIL PRICES

### GRAVITY SCHEDULE

| | Signal Hill, Calif. | Mid-Cont.* | Gulf Coast Tex.† | West Tex.‡ N.M. | Wyo. (sour) |
|---|---|---|---|---|---|
| 14-14.9 | $2.67 | | | | |
| 15-15.9 | 2.71 | | | | $1.89 |
| 16-16.9 | 2.74 | | | | 1.94 |
| 17-17.9 | 2.78 | | | | 1.99 |
| 18-18.9 | 2.82 | | | | 2.04 |
| 19-19.9 | 2.85 | | | | 2.09 |
| 20-20.9 | 2.89 | $2.75 | | $2.62 | 2.14 |
| 21-21.9 | 2.93 | 2.77 | | 2.64 | 2.19 |
| 22-22.9 | 2.97 | 2.79 | | 2.66 | 2.24 |
| 23-23.9 | 3.01 | 2.81 | $3.44 | 2.68 | 2.29 |
| 24-24.9 | 3.05 | 2.83 | 3.46 | 2.70 | 2.34 |
| 25-25.9 | 3.09 | 2.85 | 3.48 | 2.72 | 2.39 |
| 26-26.9 | 3.13 | 2.87 | 3.50 | 2.74 | 2.44 |
| 27-27.9 | 3.17 | 2.89 | 3.52 | 2.76 | 2.49 |
| 28-28.9 | 3.22 | 2.91 | 3.54 | 2.78 | 2.54 |
| 29-29.9 | 3.27 | 2.93 | 3.56 | 2.80 | 2.59 |
| 30-30.9 | 3.32 | 2.95 | | 2.82 | 2.63 |
| 31-31.9 | 3.38 | 2.97 | | 2.84 | 2.67 |
| 32-32.9 | 3.44 | 2.99 | | 2.86 | 2.71 |
| 33-33.9 | 3.50 | 3.01 | | 2.88 | 2.75 |
| 34-34.9 | 3.56 | 3.03 | | 2.90 | 2.79 |
| 35-35.9 | 3.61 | 3.05 | | 2.92 | 2.83 |
| 36-36.9 | 3.65 | 3.07 | | 2.94 | 2.87 |
| 37-37.9 | 3.68 | 3.09 | | 2.96 | 2.89 |
| 38-38.9 | | 3.11 | | 2.98 | 2.91 |
| 39-39.9 | | 3.13 | | 3.00 | 2.93 |
| 40 and up | | 3.15 | | 3.02 | 2.95 |

*Includes Oklahoma, part of Kansas, North Dakota, West Texas (sweet) and North Central Texas. †Low Cold test Gulf Coast. ‡Sour.

Effective dates: California January 17, 1957, east of California, January 3-January 10, 1957; Pennsylvania Grade, January 16, 1957.

Some crudes in North Central Texas and West Central Texas, are on the intermediate schedules.

### FLAT PRICES

| | |
|---|---|
| **Louisiana:** | |
| Bienville (distillate) | $3.05 |
| Ville Platte | 3.45 |
| **Texas:** | |
| East Texas | 3.25 |
| Conroe | 3.53 |
| Van | 3.08 |
| **Pennsylvania Grade:** | |
| Bradford | 4.88 |
| Middle District | 4.70 |
| Southwest Pennsylvania | 4.41 |
| West Virginia | 4.23 |
| Buckeye Grade | 4.23 |
| Zanesville Grade | 3.27 |
| **Illinois Basin** | 3.15 |
| **Canada:** | |
| Leduc-Woodbend | 2.78 |
| Redwater (Alta.) | 2.67 |
| Smiley (Sask.) | 2.44 |
| Pembina | 2.65 |

### FOREIGN

| | |
|---|---|
| **Venezuela:** | |
| Cumarebo, 48°-49.9°, Tucupido | 3.75 |
| San Joaquin, 40°-40.9°, Puerto La Cruz | 3.37 |
| Oficina, 35°-35.9°, Puerto La Cruz | 3.05 |
| Tia Juana medium, 26.5°-26.9°, Amuay* | 2.55 |
| Quiriquire, 16.5°-16.9°, Caripito | 2.45 |
| Lagunillas heavy, flat, Amuay or Las Piedras* | 2.38 |
| Bachaquero, flat, Las Piedras* | 2.23 |

Prices for all crudes of 24° or lighter vary 2 cents per degree change, up or down. All crudes heavier than 24° vary 2.5 cents per half-degree gravity change.

*Also available at La Salina at 3 cents per barrel less.

| | |
|---|---|
| **Middle East, Persian Gulf (cargoes, f.o.b. lifting port):** | |
| ★ Arabian, 36.0°-36.9°, Ras Tanura | $2.12-2.14 |
| ★ Iranian, 34.0°-34.9°, Bandar Masur | 2.04 |
| ★ Iranian, 34.0°-34.9°, Abadan | 1.99 |
| ★ Iraq, 36.0°-36.9°, Fao | 2.00 |
| ★ Kuwait, 31.0°-31.9°, Mina-al-Ahmadi | 1.85 |
| ★ Qatar, 39.0°-39.9°, Umm Said | 2.19 |
| **Middle East, E. Mediterranean:** | |
| Arabian, 36.0°-36.9°, Sidon | 2.69 |
| Iraq, 36.0°-36.9°, Tripoli, Banias | 2.69 |
| **Far East (cargoes, f.o.b. Lutong, Sarawak):** | |
| Seria Light, 37°-38° | 2.60 |

### TANKER RATES PER LONG TON

(Latest reported spot fixtures)

| | |
|---|---|
| Gulf-U.S.N.H., clean (USMC—20%) | $2.28 |
| ★ Carib.-U.S.N.H., dirty (USMC—40%) | 1.62 |
| ★ P.G.-U.S.N.H., dirty (USMC—35%) | 8.26 |
| ★ P.G.-France, dirty (Scale—17.5%) (44s. 7d.) | 6.24 |

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FOR SALE: One 6XVG Ingersoll-Rand gas compressor, complete with accessories. Alfred B. Kern, 305 Kennedy Bldg., Tulsa, Oklahoma.

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**Clark Bros.:** 3¼" to 11", 21", 28" and 30" x 14" VTH

**Ingersoll-Rand:** 4½", 5½", 6", 8", 9", 9¼", 10", 11½", 13" x 12" XVG; 5¼", 7½", 9", 12½", 14½" x 14" and 12" x 15" KVG

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- Two ea. 7 x 3½ x 7 tankem CP with jacket water & gas coolers—skid mounted with engines. Approx. 35 hp.
- 10 x 10 Ingersoll, skid mounted—50 hp.
- 50 hp., 5½ x 5½, 2 cyl. vert. Gardner Denver. New.
- New Carson "packaged units" Worthington compressor, Le Roi engine to fit your requirements.

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- 160 CFM Worthington air compressor powered by Hercules engine.
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### FORMER LACY REFINERY

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1—5' x 96' tower, 40 tray, 135# WP.
1—2' x 50' tower, 24 trays.
1—Ethyl lead plant.
2—Upshot heaters, 10 mil. BTU/hr.
8—Welded storage tanks, 5,000, 2,000 bbl.
8—Hi-vol pumps, 10 x 7 x 18, 10 x 6 x 12, 6 x 4 x 12, 6 x 3 x 8.

## IN STOCK

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2—12' x 45' Storage Tanks, 25#
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1—18" x 32' Tower, 15 Trays, 160#
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3 Pacific ITB, 400 gpm.—2,000' hd. 735 gpm—3,100' hd.
5 Pacific SVTB, 612 gpm—600' hd. 324 gpm—480' hd, 308 gpm—516' hd, 193 gpm—389' hd.
1 Pacific HVTB (unused) 1270 GPM—408' Hd.
BJ hot oil pump 3 x 9, 13 st, 325 gpm, 4600' hd.

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4—Kellogg Adm. Fltg. Hd. 2200, 1300 Sq. Ft., 315#
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18—GR Fin Tubes, 73 Sq. Ft.
6—Brown fintube exchangers, 300# 140 Sq. Ft. 4-6 chrome
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30—304 SS shell & tube condensers 100-1000 Sq. Ft.

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1 Worth LTC-6 800 hp.
3 Penn Comps 100 CFM 500 lbs.
385 CFM 160 lbs.

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Tremendous selection stainless steel and steel valves 1½"-6".
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**(2) Hot Oil Pumps—Pacific 8 Stage Centrifugal SS Lined Type ITB 2½" 334 GPM @ 1000 psi 750° F. 312 BHP**

**REBOILERS**

993 Sq. Ft. 600# shell and tube
970 Sq. Ft. 250# shell 125# tubes

**CONDENSERS—HEAT EXCHANGERS**

| Sq. Ft. | Shell | | Tubes | |
|---|---|---|---|---|
| 3100 | steel | 150# | steel | 200# |
| 1400 | " | 75# | 12 pass | 125 (2) |
| 1080 | " | 250# | Admir. | 125 |
| 940 | " | 125# | " | 150 5 pass |
| 760 | " | 125# | steel | 125 |
| 331 | " | 250# | Admir. | 250 (7) |
| 331 | " | 250# | " | 125 (3) |

**NEW FURNACE & CONDENSER TUBES**

| Quan. | O.D. | Wall | Length | Metal |
|---|---|---|---|---|
| 6 | 6.625" | x ¼" | x 32'0" | Croloy 5 |
| 14 | 5.500" | x ¼" | x 32'0" | " 5 |
| 38 | 5.500" | x 11/16" | x 20'0" | " 2 |
| 95 | 4.000" | x ⅜" | x 24'8" | " 5 |
| 63 | 3.000" | x ¼" | x 15'0" | " 7 |
| 110 | 1.000" | x 11ga. | x 10'10" | Steel |
| 475 | .750" | x 13ga. | x 15'11" | " |
| 417 | .625" | x 14ga. | x 10'10" | Admiralty |
| 175 | .625" | x 14ga. | x 6'8" | " |

**PRESSURE VESSELS**

3'x23'6" x 1 1/16"—600 psi (2)
10,000 bbl. Horton Spheroid 15 psi @ 450° F.

**TANKS**

| | |
|---|---|
| 55,000 bbl. | 113' x 30' |
| 10,000 bbl. | 49' x 29' |
| 5,000 bbl. | 35' x 30' |
| 27,000 gal. | 10' x 40' Horiz. |
| 18,000 gal. | 9' x 36' x ⅜" Horiz. |
| 15,000 gal. | 9' x 30' x ½" " |
| 12,000 gal. | 8' x 30' x ⅜" " |
| 10,000 gal. | 10' x 15' x ½" Vert. |

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4' x 49'6" x ⅜"—24 trays 330 psi
8' x 5' x 85'—25 trays 250 psi
8'x34'6"x½"—10 trays
6'x36'x½"—9 trays 100 psi
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5'x58'x⅜"—26 trays 50 psi

**PUMPS**

| | | | | |
|---|---|---|---|---|
| 1500 | GPM | @ | 100' head | 50 HP |
| 1000 | " | " | 40' " | 15 HP |
| 900 | " | " | 125' " | 40 HP |
| 800 | " | " | 100' " | 50 HP |
| 600 | " | " | 100' " | 25 HP |
| 570 | " | " | 516' " | 125 HP |
| 400 | " | " | 225' " | 40 HP |
| 350 | " | " | 560' " | 75 HP |
| 250 | " | " | 223' " | 25 HP |

**Large quantity other Centrifugal Pumps Motor driven, Turbine and Steam—Simplex—Duplex—Hot Oil Send us your requirements**

Proportioneers 3XXL
Gear Driven 6 x 10 Gardner
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PIPE, VALVES, FITTINGS
AIR AND GAS COMPRESSORS
MACHINE TOOLS
CAR LOADING RACKS—(2) 28 SPOT
WATER TREATING PLANT 50,000#/Hr.
8500 GAL. ETHYL BLENDING PLANT

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### ROTARY DRILLING RIGS
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Model O Cardwell—4000' to 8500' Drilling
Model U15 Unit Rig—4000' to 8500' Drilling

All equipped with Lee C. Moore Mast and substructure. Rigs complete in every detail.

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Model 66 Wichita Spudder

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## ARMITE DRILL COLLAR & TOOL JOINT COMPOUND

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Petro. Industries Consultants, C.A. Caracas, Venez.

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FOR SALE: 3, R. L. Cardwell Spudders. Double and Three Drum type. 86 Ft. Double Derricks. All tools complete. A. #1 Condition (NO JUNK). Write Rt. #4, Box #39-A or call 2648 Duncan, Okla.

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**Reply To: Box K-216,**
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Experienced drilling man. Able to run casing and perform all phases of oil or gas well completion work. Act as Company representative on contract rig. Offshore and onshore work. Attractive starting salary.

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Please furnish complete details in regard to qualifications and experience, including salary required. If applicants are now employed, replies will be kept confidential.

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Graduate Engineer required as Gas-Gasoline Plant Superintendent in Alberta. Previous operating experience as a prerequisite. Full employee benefits.

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***For Caracas, Venezuela***

CHEMICAL ENGINEERING DEGREE.
MINIMUM 5 YEARS EXPERIENCE

including compressor plant operations, design and operating gasoline plants and gas pipeline work. Capable setting up department when required and working with government representatives.

GOOD SALARY, ALLOWANCES, OPPORTUNITY OBTAIN ADDITIONAL EXPERIENCE AND ADVANCEMENT.

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# — ENGINEERS —

**PETROLEUM**
**GAS**
**DRILLING**

**RESERVOIR**
**MECHANICAL**
**PIPE LINE**

Subsidiary operating in Venezuela has opportunities for engineers with/without experience. Salary commensurate with experience.

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**Bowling Green Station, New York 4, New York**

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DRILLING SUPERINTENDENT for South Louisiana operations of Independent Oil Operator and Drilling Contractor. Must be engineering graduate with drilling experience. Experience as drilling superintendent preferred. Reply should include resume of experience and qualifications. Box K-238, The Oil and Gas Journal, Tulsa, Oklahoma.

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Opening for graduate engineer. Experienced in oil pipe line, Pump Station & Terminal design.

**WRITE or CALL**

**PIPE LINE ENGINEERING COMPANY**

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**Phone: FLeetwood 7-1781**

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CORROSION ENGINEERS: Outstanding opportunity for college graduates with recent field experience, as sales representatives for new Chemicals Division of progressive company. Tuf-Plate Corrosion Inhibitors, related chemicals and processes. Age 27-33. Write Cherokee Laboratories, Inc., Box K-227, The Oil and Gas Journal, Tulsa, Oklahoma.

SALES ENGINEER—Have opening for aggressive man with minimum of 2 years engineering training and 5 years experience selling to oil industry. Age 28-45. Firm is Distributor for Waukesha and other lines in Rocky Mountain States. Give full school and work history in first letter. Waukesha Engine & Equipment Company, Box 5468 T.A., Denver, Colorado.

PETROLEUM ENGINEERS. Independent oil company has openings in West Texas, Northern and Central Louisiana for graduate petroleum engineers under 35 years of age, with knowledge of field production problems, work-overs, completions, and water flood operations. Replies confidential. Send resume with small photo and transcript of college credits to P. O. Box 2162, Dallas 21, Texas.

## HELP WANTED

SEISMIC COMPUTERS with Degree in Geology or Geological Engineering needed by large independent oil company for work in Oklahoma. This is an excellent career opportunity for a recent graduate or for a person having up to three years experience. Applicants should submit a college transcript, photograph, and a summary of work background. Box K-215, The Oil and Gas Journal, Tulsa, Oklahoma.

THE POSITION YOU WANT: Oil Industry companies are looking for men to fill every conceivable kind of position. If you didn't find the position in this column that you are looking for, use a "Situation Wanted" classified advertisement to state your qualifications. Some company is probably looking for your ability. See box heading for classified rates or write The Oil and Gas Journal, Tulsa, Oklahoma.

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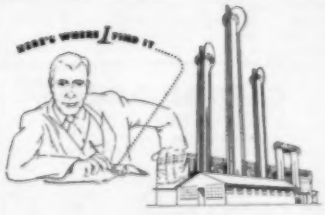


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## SITUATIONS WANTED

GEOPHYSICIST-MATHEMATICIAN: Twelve years seismic experience Mid-Continent and Rocky Mountain areas. Mathematics a hobby. Have programmed for IBM 650 Computer. Interpretation, research; domestic or foreign. W. R. Doll, 1464 S. Benton Street, Denver 14, Colorado.

EVALUATION-Landman-Supervisory: Ten years varied experience, evaluating drilling and production deals, supervision of drilling program, and land acquisition, management level. Age 37. Will relocate. Excellent references. C. R. Vandervoort, P. O. Box 1082, Midland, Tex.

GEOLOGIST: nine years Texas and Mid-Continent. Major, independent as District and Chief Geologist, and consulting experience. Can handle exploration, development, evaluation, completion. Masters degree. Desires responsible position with independent company. Box K-237, The Oil and Gas Journal, Tulsa, Oklahoma.

ENGINEER: 26, B.S. (Chem. E.) 3½ years varied production experience with major producing company. Desires responsible position with progressive company, preferably in Denver area or on West Coast. Box K-240, The Oil and Gas Journal, Tulsa, Oklahoma.

INSTRUMENT ENGINEER and supervisor with experience in petroleum, chemical and mining. Prefer Rocky Mountain or Pacific Northwest. Age 46. Box K-228, The Oil and Gas Journal, Tulsa, Oklahoma.

REFINERY MANAGER desires position in south as refinery manager or terminal manager. 43 years of age, 25 years experience. Reply, if interested to: Box K-229, The Oil and Gas Journal, Tulsa, Oklahoma.

GEOPHYSICIST, eighteen years of seismic interpretative and supervisory experience, mostly in Latin America, seeks more responsible position in foreign oil exploration. Married, 39 years old, employed. Box K-235, The Oil and Gas Journal, Tulsa, Oklahoma.

## SITUATIONS WANTED

FINANCIAL EXECUTIVE — M.B.A. finance. Good Wall Street connections. Desires assoc. with Independent needing expert financial counsel. Formerly controller Independent. Box K-232, The Oil and Gas Journal, Tulsa, Oklahoma.

THERMAL CRACKING, crude unit and absorption plant operator with ten years experience at superintendents level desires connection as refinery or terminal superintendent. Box K-234, The Oil and Gas Journal, Tulsa, Oklahoma.

GEOLOGIST—7 years experience—thoroughly trained all phases. Can handle exploration and development program. Working knowledge of Land, Production, Tax and Finance. Abundant professional and business contacts. Desire salary-interest or retainer arrangement. Presently employed. Box K-223, The Oil and Gas Journal, Tulsa, Oklahoma.

GEOLOGIST-GEOPHYSICIST: Thirty-one years old, married, degree, desires permanent location. Eight years in seismic and geologic work, field and office. Qualified to initiate, supervise seismic program in association with geological staff. Box K-234, The Oil and Gas Journal, Tulsa, Oklahoma.

GEOLOGIST—Masters Degree, 23 years experience. Ten years Major Oil Co., thirteen years as Geophysical Director and Exploration Manager with large Independent. Experienced in Gulf Coast, Mid-Continent and Rocky Mountains. Greatest experience in organizing and directing exploration and drilling program, and originating and closing land and drilling deals. Now on salary plus interest basis with drilling company desiring to sell out. Will consider salary or salary plus small carried interest. Will go anywhere. Box K-231, The Oil and Gas Journal, Tulsa, Oklahoma.

## WANTED

WANTED RETAINER—Panel of technicians, 2 geologists, drilling and production engineer, landman, experienced and college graduates, desire monthly cash and override retainer for good Gulf Coast drilling deals and representation. Inquiries invited. Personal and bank references furnished. Box K-236, The Oil and Gas Journal, Tulsa, Oklahoma.

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## LEASE AND DRILLING BLOCKS

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INTEGRATED WILDCAT operation including 3000 acres active area Powder River Basin, Wyoming, Fort Worth Spudder J-27, 2000 ft. 7-inch J-55 National 20 lb. pipe, 1660 ft. 5½ inch pipe, truck, trailer house, water tank, numerous other items. Unable to manage operation at long range, offer complete package $25,000 plus 5% override. E. H. Ruble, P. O. Box 54, Duluth 1, Minn.

OIL AND GAS MINERAL LEASES available in Dell City area of Hudspeth County, Texas. U. S. Geological Survey Map shows anticlinal axis nearby favorable for oil-gas structure. Am fee landowner of over 2000 acres. Write quickly to: Jefferson G. Smith, 215 Littlefield Building, Austin 15, Texas.

FOR SALE AT INVENTORY: Oil property —Chautauqua County, Kansas. Suitable for water flood, with possibility of deep production, consisting of 430 acres in one block with 9 wells, power, tanks & lease house. $18,000. Four hundred acres in another block with 7 old producing wells, $12,000. Production from these wells dates back to 1918. Pipe line connections, land owner royalties only. 30 to 50 ft. sand. Contact Kenneth Johnson, at Johnson Supply Store, Osawatomie, Kansas.

4,000 PLUS ACRES fee leases covering closed visual structure North-Central Montana. 35 miles from prolific Bowes oil field. Been tied up for ten years. Drilling to about 3,200 ft. min. required. Trams Corporation. 345 Milton Ave., Salt Lake City, Utah. Phone INgersoll 7-6389.

17,500 ACRES prospective gas and oil wildcat. Anticline established. Federal leases. Southern Utah, Wasatch Plateau. Ready market. Pipeline traverses block. Outright purchase, or drilling deal. Box K-196, The Oil and Gas Journal, Tulsa, Oklahoma.

CASH FOR LEASE BLOCKS anywhere, 640 acres up. No drilling commitments. P. O. Box 584, Manhattan Beach, California.

800 ACRE OIL LEASE
Near Chanute, Kansas, shallow, 2 wells on pump, and water flood equipment. Very good possibilities. Sell at sacrifice, $11,500 (Owner). Box K-230, The Oil and Gas Journal, Tulsa, Oklahoma.

FOR PROFITS—Cheap Leases going into Drilling Units with override. Stand investigation. References. E. M. Adams, Marshall, Texas.

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**4-Corners Area. November Indian Lease sale brought 30 Million Dollars. Some leases sold for $3,200 per acre. Wells estimated up to 1500 barrels of oil per day. Oil Leases from $2.25 an acre. Fortunes being made. Write for free information now. ATLAS OIL SURVEY, Dept. OG-6, Colorado Bldg., Denver 2, Colo.**

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I HAVE FOR SALE 500 bbls. oil per day loaded in your cars or mine in Wyoming. Operator, Box 2153, Denver, Colorado.

FOR SALE—Water flood operation in Eastern Kansas—30 Barrels per day production. 350' to 500' depth—for full information contact Johnson Supply Store, Osawatomie, Kansas.

## PRODUCTION WANTED

WANTED: Oil or gas production, any size, prefer, Okla., N. M., Tex., Colo. or Kan. B. Thurston, 1427 Princeton NE, Albuquerque, N. M.

WANT TO BUY—Oil Properties, settled or semi-settled production. 100 to 5,000 barrels daily in Oklahoma and Kansas. Contact Morris Sitrin, 1215 First National Building, Tulsa, Oklahoma.

PRODUCING oil, gas properties, also royalties wanted. Any size, any amount. Complete details in first letter. Box 231, Scarsdale, N. Y.

## BUSINESS OPPORTUNITIES

FINANCIAL CONTACTS. Underwriters, Brokers, Private Finders of Capital reached. No shopping. Confidential. FREE ENTERPRISE ASSOCIATES, 817 51st St., Brooklyn, N. Y.

SMALL OIL COMPANY will do financing shortly through firm underwriting of its common stock. Interested in acquiring additional production through merger or stock or cash consideration. Reply to Box K-206, The Oil and Gas Journal, Tulsa, Oklahoma.

FUNDS AVAILABLE to drill 100 wells on proven acreage only. Detailed offers invited. Box 613, Fort Worth, Texas.

PATENTED MINES FOR SALE. We own twenty-five patented mining claims in Crystal Area, Rock Creek Mining District, Gunnison County, Colorado. Due to my advanced age advisable to dispose of them. Sale or bonded lease to responsible parties, either entirely or in block. PROVEN high grade lead and zinc, some copper, pitchblend present . . . may have commercial uranium. FOR DETAILS address Vernon J. Rose, 2803 Benton Boulevard, Kansas City, Missouri.

**CAPITAL GAINS**

If you have royalties, over-riding royalties or production that you want to convert into capital gain dollars for stock that is actively traded and will submit a complete comprehensive evaluation report, we will give it immediate consideration and meet, preferably in New York for conclusion. All replies will be held in strict confidence.

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## Successful Wildcats

(Continued from page 247)

### NORTH DAKOTA

Bottineau County: Carter Oil Co. and Phillips 1 Oscar Fossum, C NE NE 31-162n-81w. IPP 137 BO, 86 BWPD, Mission Canyon discovery, new field. TD 4,302 ft. Lodgepole.

### NORTH TEXAS

Wise County: Southern Union Gas Co. 1 Joe Rogers, Sec. 15, Hunt CSL Sur., 10 mi. E Alvord, 1½ mi. N gas production. IP 216 BOPD, 18/64-in., 41°-gravity, GOR 733, TP 171 psi., conglomerate pay 6,542-52 ft. TD 6,786 ft., elev. 986 ft.

### WEST CENTRAL TEXAS

Jones County: Jocelyn-Varn Drilling Co. et al 1 Smith, 26-19-T&P, 6 mi. N Trent. IPP 86 BOPD, 42°-gravity, GOR 200, Ellenburger 5,471-79 ft. TD 5,483 ft., elev. 1,954 ft.

Nolan County: Oxford & Stasney Drilling Co. 1-D Ray Alderman, 65-1-A H&TC, 6 mi. NW Blackwell. IP 4.5 M.c.f. gas, plus 24 bbl. condensate, 24/64-in., TP 900 psi., Cisco 4,033-42 ft. TD 5,054 ft., elev. 2,214 ft.

### WEST TEXAS

Crane County: Shell Oil Co. 1-A Edwards, 1-B23-PSL, 9 mi. SE Penwell. IP 221 BOPD, 37°-gravity, GOR 796, Pennsylvanian 9,166-90, 9,212-20 ft. TD 12,516 ft., elev. 2,810 ft.

Irion County: Humble Oil & Refining Co. 8 Blakley, 189-1-T&P, 8 mi. NW Irion. IPP 6 BOPD, 30°-gravity, GOR 540, San Andres 1,828-46 ft. TD 2,047 ft.

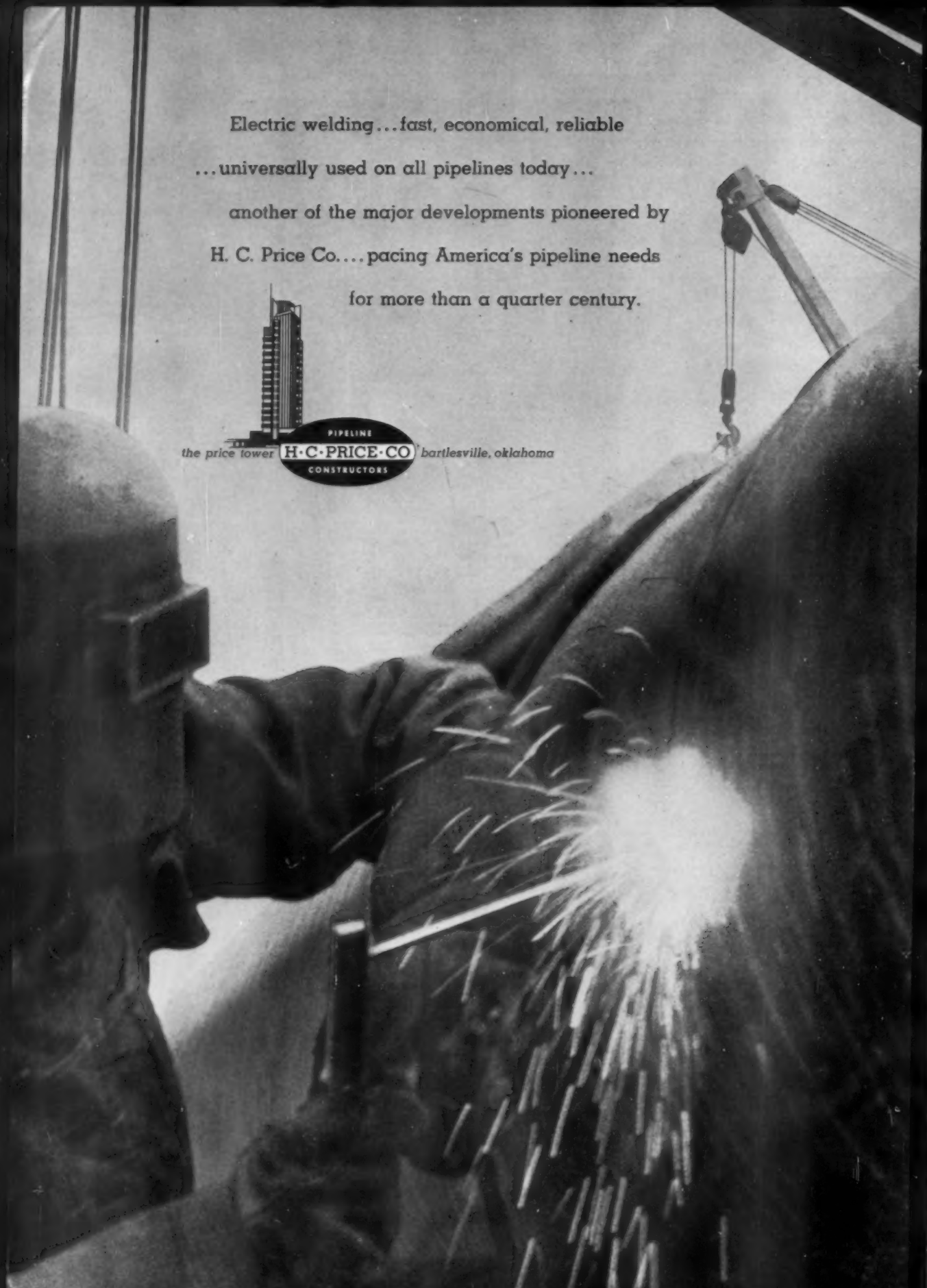
Runnels County: Ambassador Oil Corp. 1 Wessels, E. S. Fields Sur. 40, 4½ mi. E Norton. IP 117 BOPD, 16/64-in., 42°-gravity, GOR 435, TP 225 psi., Odom lime 4,251-53 ft. TD 4,790 ft., elev. 1,864 ft.

Investors Producing Co. 1 Hays, Alexander Lassier Sur. 174, 2 mi. N Ballinger. IPP 56 BOPD, 47°-gravity, GOR 200, Gardner lime 4,071-77 ft. TD 4,093 ft., elev. 1,689 ft.

Schleicher County: The Texas Co. 1 Harris, NCT-1, 64-25-H&TC, 20 mi. NE Eldorado. IP calculated open-flow, 5,700 M.c.f. gas, Harkey sand (Pennsylvanian) 4,686-92 ft., shut-in pressure 1,536 psi. TD 5,300 ft., elev. 2,268 ft.

### TEXAS GULF COAST

Galveston County: The Texas Co. 1 St. Tract 235, East Galveston Bay, 12 miles northeast of Galveston City and southeast of Hannah Reef field. IPF 42 BOPD, 11/64-in. choke, 8,048-54 and 9,061-66 ft., 40°, GOR 16,400:1. TD 8,278 ft. New oil discovery.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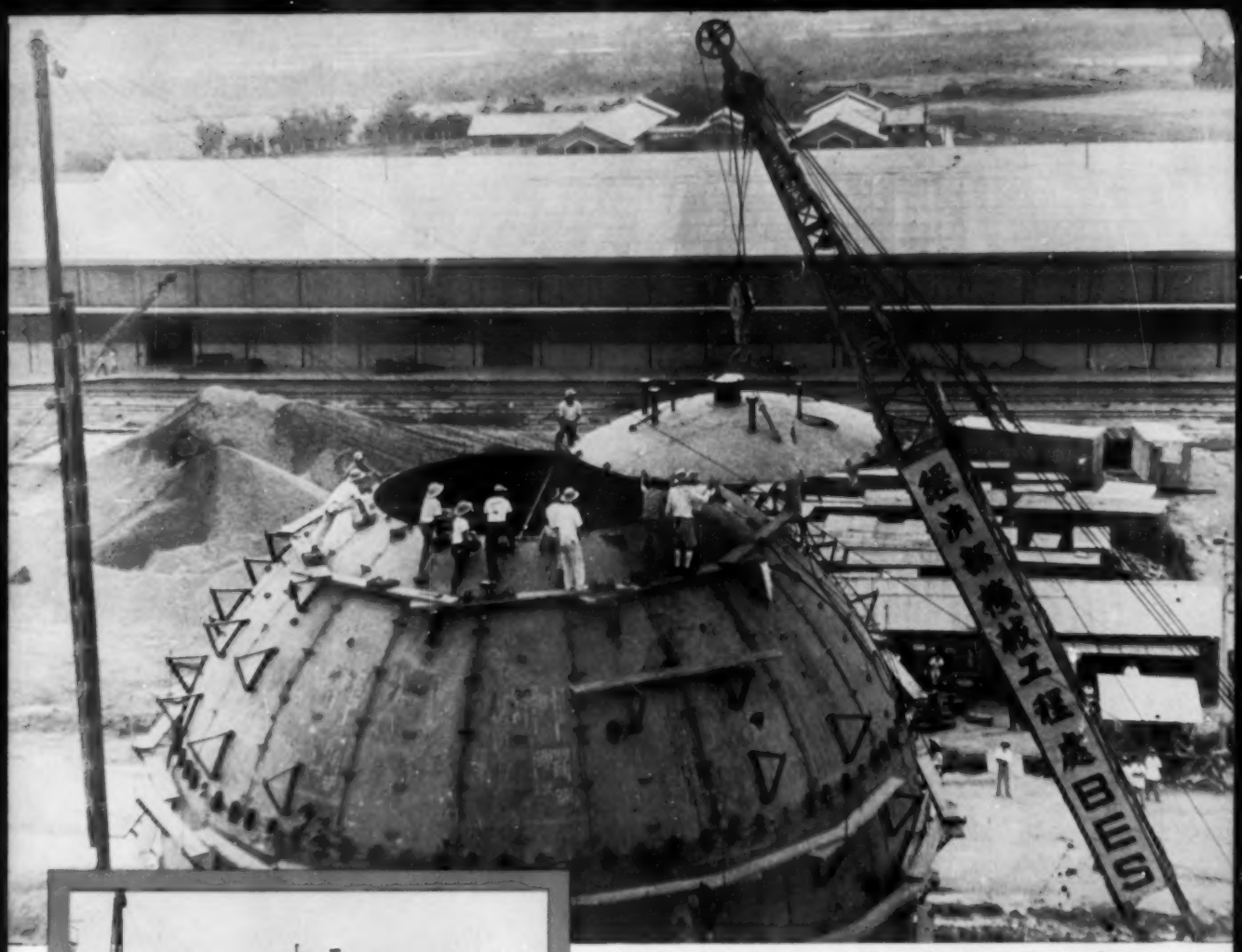
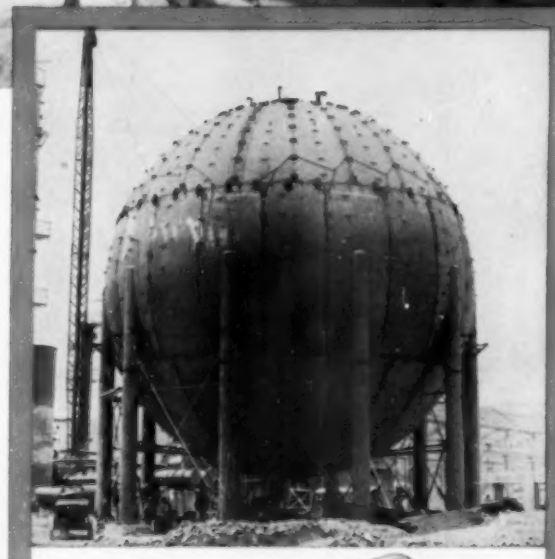
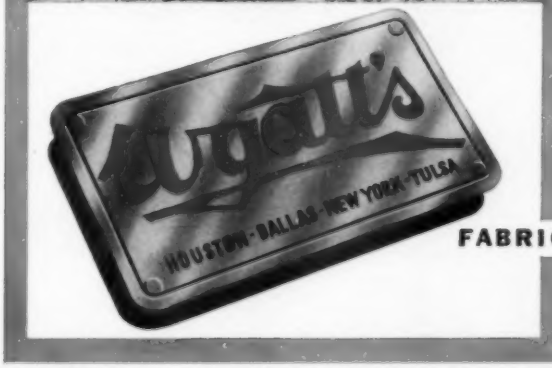


Spherical storage for ammonia, fabricated in Wyatt's Houston plant and erected in Taiwan (Formosa).



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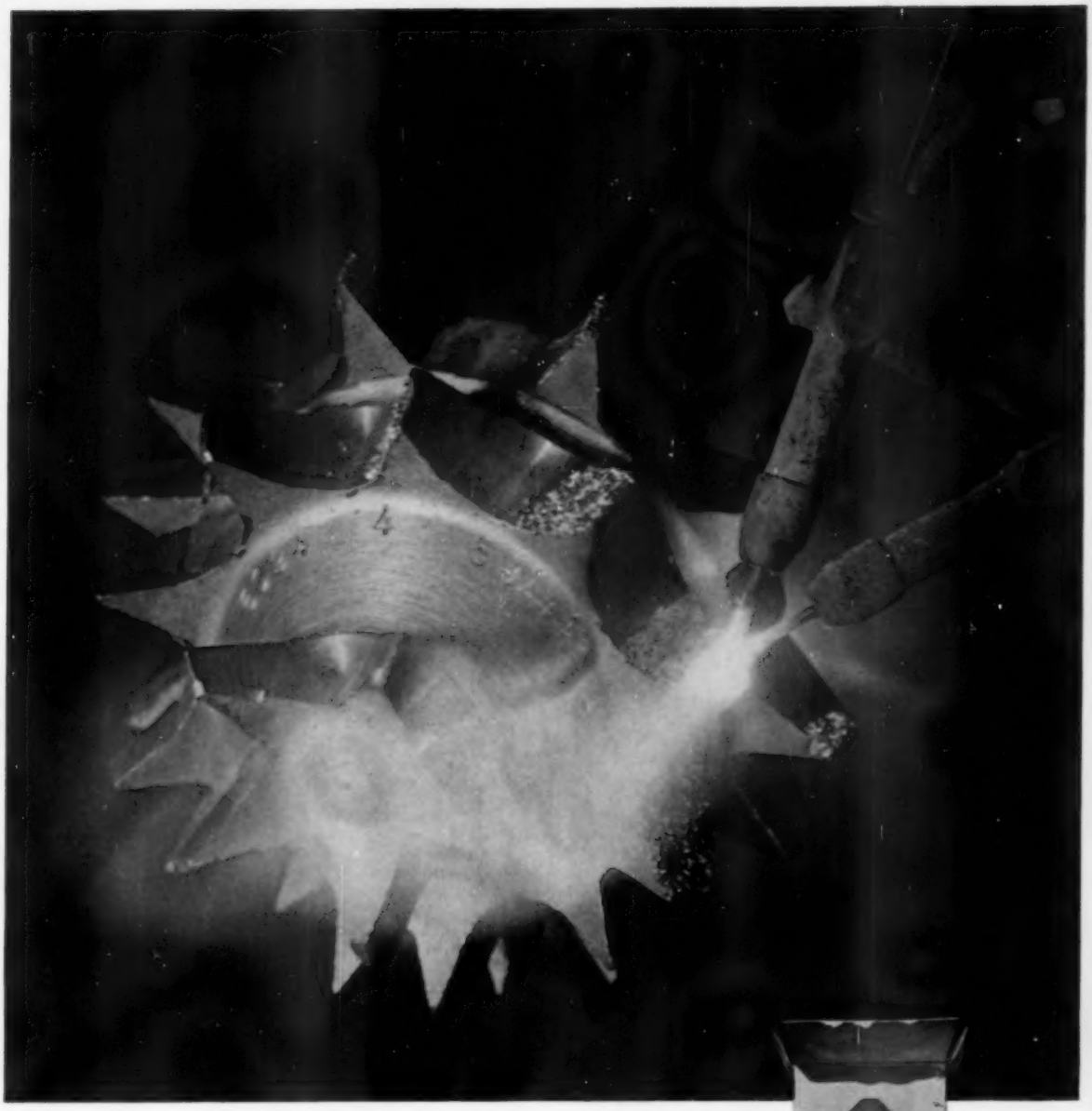

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